ANEXO 11: **Cálculo de los Residuos**

En este anexo se presentan las derivadas del potencial complejo para el modelo Clásico, SZ-I, SZ-II y SZ-III. Además, se resuelven los términos provenientes de $\left(\frac{dF\,z}{dz}\right)^2$, aplicando el Teorema del Residuo (Murray, 1.971; Hauser, 1.973).

Modelo Clásico

$$\frac{dF\,z}{dz} \qquad V_o - V_o\frac{a^2}{z^2} \qquad \frac{1}{2}i\,\overline{z}$$

$$\left(\frac{dF\,z}{dz}\right)^2 \qquad V_o^2 - 2V_o^2\frac{a^2}{z^2} \quad iV_o\,\overline{z} \quad V_o^2\frac{a^4}{z^4} - iV_o\frac{a^2}{z^3} - \; - \frac{1}{4}\frac{2}{2z^2}$$

Para a_1

$$f\,z \qquad V_o^2$$

$$a_1 \quad 0$$

Para a_2

$$f\,z \qquad -2V_o^2\frac{a^2}{z^2}$$

$$R \qquad \frac{1}{2-1\;!}\lim_{z\;0}\frac{d^{2-1}}{dz^{2-1}}\left(\;z-0\;^2\left(-2V_o^2\frac{a^2}{z^2}\right)\right) \quad 0$$

$$a_2 \quad 0$$

Para a_3

$$f\,z \qquad iV_o\,\overline{z}$$

$$R \quad \lim_{z\;0}\;z-0\;\;iV_o\,\overline{z} \qquad iV_o-$$

$$a_3 \quad iV_o-$$

Para a_4

$$f\,z \qquad V_o^2\frac{a^4}{z^4}$$

$$R \qquad \frac{1}{4-1\;!}\lim_{z\;x}\frac{d^{4-1}}{dz^{4-1}}\left(\;z-0\;^4\left(V_o^2\frac{a^4}{z^4}\right)\right) \quad 0$$

$a_4 \quad 0$

Para a_5

$f\,z \qquad -iV_o\dfrac{a^2}{z^3} -$

$R \qquad \dfrac{1}{3-1\;!}\lim_{z\;0}\dfrac{d^{3-1}}{dz^{3-1}}\left(\ z-0\ ^3\left(-iV_o\dfrac{a^2}{z^3}-\right)\right)\quad 0$

$a_5 \quad 0$

Para a_6

$f\,z \qquad -\dfrac{1}{4}\dfrac{2}{2z^2}$

$R \qquad \dfrac{1}{2-1\;!}\lim_{z\;0}\dfrac{d^{2-1}}{dz^{2-1}}\left(\ z-0\ ^2\left(-\dfrac{1}{4}\dfrac{2}{2z^2}\right)\right)\quad 0$

$a_6 \quad 0$

Modelo SZ-I

$\dfrac{dF\,z}{dz} \qquad V_o - V_o\dfrac{a^2}{z^2}\quad \dfrac{1}{2}i\,\dfrac{}{z}\quad \dfrac{1}{2}\dfrac{Q}{(z-be^i\ )}\quad \dfrac{1}{2}Q\dfrac{b}{(zb-a^2e^i\ )}-\dfrac{1}{2}\dfrac{Q}{z}$

$\left(\dfrac{dF\,z}{dz}\right)^2 \quad \dfrac{1}{4}\dfrac{Q^2}{^2(z-be^i\ )^2}-\dfrac{1}{4}\dfrac{2}{2z^2}-2V_o^2\dfrac{a^2}{z^2}\quad V_o^2\dfrac{a^4}{z^4}$

$\dfrac{1}{4}\dfrac{Q^2}{2z^2}\quad V_o^2 - iV_o\dfrac{a^2}{z^3}-\quad V_o\dfrac{a^2}{z^3}\dfrac{Q}{}-\dfrac{1}{2}i\dfrac{}{2z^2}Q\quad \dfrac{Q}{(z-be^i\ )}V_o - \dfrac{Q}{(z-be^i\ )}V_o\dfrac{a^2}{z^2}\quad \dfrac{1}{2}i\dfrac{Q}{^2(z-be^i\ )}$

$\dfrac{}{z}\quad \dfrac{1}{2}\dfrac{Q^2}{^2(z-be^i\ )}\dfrac{b}{zb-a^2e^i}-\dfrac{1}{2}\dfrac{Q^2}{^2(z-be^i\ )z}\quad Q\dfrac{b}{(zb-a^2e^i\ )}V_o - Q\dfrac{b}{(zb-a^2e^i\ )}V_o$

$\dfrac{a^2}{z^2}\quad \dfrac{1}{2}iQ\dfrac{b}{^2(zb-a^2e^i\ )}\dfrac{}{z}\quad \dfrac{1}{4}Q^2\dfrac{b^2}{^2(zb-a^2e^i\ )^2}-\dfrac{1}{2}Q^2\dfrac{b}{^2(zb-a^2e^i\ )z}\quad iV_o\dfrac{}{z}-V_o\dfrac{Q}{z}$

Para a_1

$f\,z \qquad \dfrac{1}{4}\dfrac{Q^2}{^2(z-be^i\ )^2}$

$a_1 \quad 0$

Para a_2

$$f\ z \quad -\frac{1}{4}\frac{2}{2_z2}$$

$$Res \quad \frac{1}{2-1\ !}\lim_{z\ 0}\frac{d^{2-1}}{dz^{2-1}}\left(\ z-0\ ^2\left(-\frac{1}{4}\frac{2}{2_z2}\right)\right) \quad 0$$

$$a_2 \quad 0$$

Para a_3

$$f\ z \quad -2V_o^2\frac{a^2}{z^2}$$

$$Res \quad \frac{1}{2-1\ !}\lim_{z\ 0}\frac{d^{2-1}}{dz^{2-1}}\left(\ z-0\ ^2\left(-2V_o^2\frac{a^2}{z^2}\right)\right) \quad 0$$

$$a_3 \quad 0$$

Para a_4

$$f\ z \quad V_o^2\frac{a^4}{z^4}$$

$$Res \quad \frac{1}{4-1\ !}\lim_{z\ 0}\frac{d^{4-1}}{dz^{4-1}}\left(\ z-0\ ^4\left(V_o^2\frac{a^4}{z^4}\right)\right) \quad 0$$

$$a_4 \quad 0$$

Para a_5

$$f\ z \quad \frac{1}{4}\frac{Q^2}{2_z2}$$

$$Res \quad \frac{1}{2-1\ !}\lim_{z\ 0}\frac{d^{2-1}}{dz^{2-1}}\left(\ z-0\ ^2\left(\frac{1}{4}\frac{Q^2}{2_z2}\right)\right) \quad 0$$

$$a_5 \quad 0$$

Para a_6

$$f\ z \quad V_o^2$$

$$a_6 \quad 0$$

Para a_7

$$f\ z \qquad -iV_o\frac{a^2}{z^3} -$$

$$Res \qquad \frac{1}{3-1\ !}\lim_{z\ 0}\frac{d^{3-1}}{dz^{3-1}}\left(\ z-0\ ^3\left(-iV_o\frac{a^2}{z^3}-\right)\right) \qquad 0$$

$$a_7 \qquad 0$$

Para a_8

$$f\ z \qquad V_o\frac{a^2}{z^3}\frac{Q}{}$$

$$Res \qquad \frac{1}{3-1\ !}\lim_{z\ 0}\frac{d^{3-1}}{dz^{3-1}}\left(\ z-0\ ^3\left(V_o\frac{a^2}{z^3}\frac{Q}{}\right)\right) \qquad 0$$

$$a_8 \qquad 0$$

Para a_9

$$f\ z \qquad -\frac{1}{2}i\frac{}{2z^2}Q$$

$$Res \qquad \frac{1}{2-1\ !}\lim_{z\ 0}\frac{d^{2-1}}{dz^{2-1}}\left(\ z-0\ ^2\left(-\frac{1}{2}i\frac{}{2z^2}Q\right)\right) \qquad 0$$

$$a_9 \qquad 0$$

Para a_{10}

$$f\ z \qquad \frac{Q}{(z-be^i\ )}V_o$$

$$a_{10} \qquad 0$$

Para a_{11}

$$f\ z \qquad -\frac{Q}{(z-be^i\ )}V_o\frac{a^2}{z^2}$$

$$Res \quad \frac{1}{2-1\ !}\lim_{z\to 0}\frac{d^{2-1}}{dz^{2-1}}\left(\ z-0\ ^2\left(-\frac{Q}{(z-be^i\ )}V_o\frac{a^2}{z^2}\right)\right)\qquad \frac{1}{b^2e^{2\ i}}V_o a^2\frac{Q}{}$$

$$a_{11}\qquad \frac{1}{b^2e^{2\ i}}V_o a^2\frac{Q}{}$$

Para a_{12}

$$f\ z\qquad \frac{1}{2}i\frac{Q}{^2(z-be^i\ )}\frac{}{z}$$

$$Res\quad \lim_{z\to 0}\left(\ z-0\ \left(\frac{1}{2}i\frac{Q}{^2(z-be^i\ )}\frac{}{z}\right)\right)\qquad -\frac{1}{2}\frac{i}{be^i}\frac{Q}{2}$$

$$a_{12}\qquad -\frac{1}{2}\frac{i}{be^i}\frac{Q}{2}$$

Para a_{13}

$$f\ z\qquad \frac{1}{2}\frac{Q^2}{^2(z-be^i\ )}\frac{b}{zb-a^2e^i}$$

$$Res\quad \lim_{z\to\frac{a^2e^i}{b}}\left(\left(z-\frac{a^2e^i}{b}\right)\left(\frac{1}{2}\frac{Q^2}{^2(z-be^i\ )}\frac{b}{zb-a^2e^i}\right)\right)\qquad -\frac{1}{2e^i\quad -a^2\ b^2}\frac{Q^2}{2}b$$

$$a_{13}\qquad -\frac{1}{2e^i\quad -a^2\ b^2}\frac{Q^2}{2}b$$

Para a_{14}

$$f\ z\qquad -\frac{1}{2}\frac{Q^2}{^2(z-be^i\ )z}$$

$$Res\quad \lim_{z\to 0}\left(\ z-0\ \left(-\frac{1}{2}\frac{Q^2}{^2(z-be^i\ )z}\right)\right)\qquad \frac{1}{2be^i}\frac{Q^2}{2}$$

$$a_{14}\qquad \frac{1}{2be^i}\frac{Q^2}{2}$$

Para a_{15}

$$f\ z\qquad Q\frac{b}{(zb-a^2e^i\ )}V_o$$

$$Res \quad \lim_{z \to \frac{a^2 e^i}{b}} \left(\left(z - \frac{a^2 e^i}{b} \right) \left(Q \frac{b}{(zb - a^2 e^i)} V_o \right) \right) \quad \frac{Q}{} V_o$$

$$a_{15} \quad \frac{Q}{} V_o$$

Para a_{16}

$$f\,z \quad -Q \frac{b}{(zb - a^2 e^i)} V_o \frac{a^2}{z^2}$$

$$Res_1 \quad \lim_{z \to \frac{a^2 e^i}{b}} \left(\left(z - \frac{a^2 e^i}{b} \right) \left(-Q \frac{b}{(zb - a^2 e^i)} V_o \frac{a^2}{z^2} \right) \right) \quad - \frac{b^2}{a^2 e^{2i}} \frac{Q}{} V_o$$

$$Res_2 \quad \frac{1}{2-1\,!} \lim_{z \to 0} \frac{d^{2-1}}{dz^{2-1}} \left(z - 0 \right)^2 \left(-Q \frac{b}{(zb - a^2 e^i)} V_o \frac{a^2}{z^2} \right) \quad \frac{b^2}{a^2 e^{2i}} \frac{Q}{} V_o$$

$$a_{16} \quad Res_1 \quad Res_2 \quad 0$$

Para a_{17}

$$f\,z \quad \frac{1}{2} iQ \frac{b}{{}^2(zb - a^2 e^i)} \frac{1}{z}$$

$$Res_1 \quad \lim_{z \to \frac{a^2 e^i}{b}} \left(\left(z - \frac{a^2 e^i}{b} \right) \left(\frac{1}{2} iQ \frac{b}{{}^2(zb - a^2 e^i)} \frac{1}{z} \right) \right) \quad \frac{1}{2} \frac{i}{a^2 e^i} Q \frac{b}{2}$$

$$Res_2 \quad \lim_{z \to 0} \left(z - 0 \right) \left(\frac{1}{2} iQ \frac{b}{{}^2(zb - a^2 e^i)} \frac{1}{z} \right) \quad - \frac{1}{2} \frac{i}{a^2 e^i} Q \frac{b}{2}$$

$$a_{17} \quad Res_1 \quad Res_2 \quad 0$$

Para a_{18}

$$f\,z \quad \frac{1}{4} Q^2 \frac{b^2}{{}^2(zb - a^2 e^i)^2}$$

$$Res \quad \frac{1}{2-1\,!} \lim_{z \to \frac{a^2 e^i}{b}} \frac{d^{2-1}}{dz^{2-1}} \left(\left(z - \frac{a^2 e^i}{b} \right)^2 \left(\frac{1}{4} Q^2 \frac{b^2}{{}^2(zb - a^2 e^i)^2} \right) \right) \quad 0$$

$$a_{18} \quad 0$$

Para a_{19}

$$f\, z \quad -\frac{1}{2}Q^2\frac{b}{^2(zb-a^2e^i\ )z}$$

$$Res_1 \quad \lim_{z\ \frac{a^2e^i}{b}}\left(\left(z-\frac{a^2e^i}{b}\right)\left(-\frac{1}{2}Q^2\frac{b}{^2(zb-a^2e^i\ )z}\right)\right) \quad -\frac{1}{2a^2e^i}Q^2\frac{b}{2}$$

$$Res_2 \quad \lim_{z\ 0}\left(z-0\ \left(-\frac{1}{2}Q^2\frac{b}{^2(zb-a^2e^i\ )z}\right)\right) \quad \frac{1}{2a^2e^i}Q^2\frac{b}{2}$$

$$a_{19} \quad Res_1 \quad Res_2 \quad 0$$

Para a_{20}

$$f\, z \quad iV_o\frac{}{z}$$

$$Res \quad \lim_{z\ 0}\ z-0\ \ iV_o\frac{}{z} \quad iV_o-$$

$$a_{20} \quad iV_o-$$

Para a_{21}

$$f\, z \quad -V_o\frac{Q}{z}$$

$$Res \quad \lim_{z\ 0}\left(z-0\ \left(-V_o\frac{Q}{z}\right)\right) \quad -\frac{Q}{}V_o$$

$$a_{21} \quad -\frac{Q}{}V_o$$

Modelo SZ-II

$$\frac{dF\ z}{dz} \quad V_o-V_o\frac{a^2}{z^2} \quad \frac{1}{2}i\frac{}{z} \quad \frac{1}{2}\frac{Q}{(z-be^i\ p)} \quad \frac{1}{2}Q\frac{b}{(zb-a^2e^i\ p)} \quad -\frac{Q}{z}$$
$$\frac{1}{2}\frac{Q}{(z-be^i\ n)} \quad \frac{1}{2}Q\frac{b}{(zb-a^2e^i\ n)}$$

$$\left(\frac{dF\ z}{dz}\right)^2 \quad \left(V_o-V_o\frac{a^2}{z^2} \quad \frac{1}{2}i\frac{}{z} \quad \frac{1}{2}\frac{Q}{(z-be^i\ p)} \quad \frac{1}{2}Q\frac{b}{(zb-a^2e^i\ p)} \quad -\frac{Q}{z} \quad \frac{1}{2}\frac{Q}{(z-be^i\ n)} \quad \frac{1}{2}Q\frac{b}{(zb-a^2e^i\ n)}\right.$$
$$-2V_o^2\frac{a^2}{z^2} \quad -\frac{1}{4}\frac{^2}{^2z^2} \quad \frac{1}{4}\frac{Q^2}{^2(z-be^i\ n)^2} \quad \frac{1}{4}\frac{Q^2}{^2(z-be^i\ p)^2} \quad \frac{Q^2}{^2z^2} \quad V_o^2\frac{a^4}{z^4} \quad -iV_o\frac{a^2}{z^3}-$$
$$2V_o\frac{a^2}{z^3}\frac{Q}{} \quad -i\frac{}{^2z^2}Q \quad \frac{Q}{(z-be^i\ p)}V_o \quad -\frac{Q}{(z-be^i\ p)}V_o\frac{a^2}{z^2} \quad \frac{1}{2}i\frac{Q}{^2(z-be^i\ p)}\frac{}{z} \quad \frac{1}{2}\frac{Q^2}{^2(z-be^i\ p)}$$

$$\frac{b}{zb-a^2e^{i\,p}} \quad - \quad \frac{Q^2}{2(z-be^{i\,p})z} \qquad \frac{1}{2}\,\frac{Q^2}{2(z-be^{i\,p})(z-be^{i\,n})} \qquad \frac{1}{2}\,\frac{Q^2}{2(z-be^{i\,p})}\,\frac{b}{zb-a^2e^{i\,n}} \qquad Q\,\frac{b}{(zb-a^2e^{i\,p})}$$

$$V_o - Q\,\frac{b}{(zb-a^2e^{i\,p})}\,V_o\,\frac{a^2}{z^2} \qquad \frac{1}{2}iQ\,\frac{b}{2(zb-a^2e^{i\,p})}\,\frac{1}{z} \qquad \frac{1}{4}Q^2\,\frac{b^2}{2(zb-a^2e^{i\,p})^2} \quad - Q^2\,\frac{b}{2(zb-a^2e^{i\,p})z}$$

$$\frac{1}{2}Q^2\,\frac{b}{2(zb-a^2e^{i\,p})(z-be^{i\,n})} \qquad \frac{1}{2}Q^2\,\frac{b^2}{2(zb-a^2e^{i\,p})(zb-a^2e^{i\,n})} \qquad \frac{Q}{(z-be^{i\,n})}\,V_o \quad - \quad \frac{Q}{(z-be^{i\,n})}\,V_o\,\frac{a^2}{z^2} \qquad \frac{1}{2}$$

$$i\,\frac{Q}{2(z-be^{i\,n})}\,\frac{1}{z} \quad - \quad \frac{Q^2}{2(z-be^{i\,n})z} \qquad \frac{1}{2}\,\frac{Q^2}{2(z-be^{i\,n})}\,\frac{b}{zb-a^2e^{i\,n}} \qquad Q\,\frac{b}{(zb-a^2e^{i\,n})}$$

$$V_o - Q\,\frac{b}{(zb-a^2e^{i\,n})}\,V_o\,\frac{a^2}{z^2} \qquad \frac{1}{2}iQ\,\frac{b}{2(zb-a^2e^{i\,n})}\,\frac{1}{z} \quad - Q^2\,\frac{b}{2(zb-a^2e^{i\,n})z} \qquad \frac{1}{4}Q^2\,\frac{b^2}{2(zb-a^2e^{i\,n})^2}$$

$$iV_o\,\frac{1}{z} \quad - \quad 2V_o\,\frac{Q}{z} \qquad V_o^2$$

Para a_1

$$f\,z \qquad -2V_o^2\,\frac{a^2}{z^2}$$

$$Res \qquad \frac{1}{2-1\,!}\,\lim_{z\,0}\,\frac{d^{2-1}}{dz^{2-1}}\left(\,z-0\,{}^2\left(-2V_o^2\,\frac{a^2}{z^2}\right)\right) \qquad 0$$

$$a_1 \qquad 0$$

Para a_2

$$f\,z \qquad -\frac{1}{4}\,\frac{2}{2z^2}$$

$$Res \qquad \frac{1}{2-1\,!}\,\lim_{z\,0}\,\frac{d^{2-1}}{dz^{2-1}}\left(\,z-0\,{}^2\left(-\frac{1}{4}\,\frac{2}{2z^2}\right)\right) \qquad 0$$

$$a_2 \qquad 0$$

Para a_3

$$f\,z \qquad \frac{1}{4}\,\frac{Q^2}{2(z-be^{i\,n})^2}$$

$$a_3 \qquad 0$$

Para a_4

$$f\,z \qquad \frac{1}{4}\,\frac{Q^2}{2(z-be^{i\,p})^2}$$

$$a_4 \qquad 0$$

Para a_5

$$f\ z \quad \frac{Q^2}{2z^2}$$

$$Res \quad \frac{1}{2-1\ !}\lim_{z\ x}\frac{d^{2-1}}{dz^{2-1}}\left(\ z-0\ ^2\left(\frac{Q^2}{2z^2}\right)\right) \quad 0$$

$$a_5 \quad 0$$

Para a_6

$$f\ z \quad V_o^2\frac{a^4}{z^4}$$

$$Res \quad \frac{1}{4-1\ !}\lim_{z\ 0}\frac{d^{4-1}}{dz^{4-1}}\left(\ z-0\ ^4\left(V_o^2\frac{a^4}{z^4}\right)\right) \quad 0$$

$$a_6 \quad 0$$

Para a_7

$$f\ z \quad -iV_o\frac{a^2}{z^3}\ —$$

$$Res \quad \frac{1}{3-1\ !}\lim_{z\ 0}\frac{d^{3-1}}{dz^{3-1}}\left(\ z-0\ ^3\left(-iV_o\frac{a^2}{z^3}\ —\right)\right) \quad 0$$

$$a_7 \quad 0$$

Para a_8

$$f\ z \quad 2V_o\frac{a^2}{z^3}\ Q$$

$$Res \quad \frac{1}{3-1\ !}\lim_{z\ 0}\frac{d^{3-1}}{dz^{3-1}}\left(\ z-0\ ^3\left(2V_o\frac{a^2}{z^3}\ Q\right)\right) \quad 0$$

$$a_8 \quad 0$$

Para a_9

$$f\,z \qquad -i\,\frac{}{2z^2}Q$$

$$Res \qquad \frac{1}{2-1\ !}\ \lim_{z\ x}\ \frac{d^{2-1}}{dz^{2-1}}\left(\ z-0\ ^2\left(-i\,\frac{}{2z^2}Q\right)\right) \qquad 0$$

$$a_9 \qquad 0$$

Para a_{10}

$$f\,z \qquad \frac{Q}{\left(z-be^{i\ p}\right)}V_o$$

$$a_{10} \qquad 0$$

Para a_{11}

$$f\,z \qquad -\frac{Q}{\left(z-be^{i\ p}\right)}V_o\,\frac{a^2}{z^2}$$

$$Res \qquad \frac{1}{2-1\ !}\ \lim_{z\ 0}\ \frac{d^{2-1}}{dz^{2-1}}\left(\ z-0\ ^2\left(-\frac{Q}{\left(z-be^{i\ p}\right)}V_o\,\frac{a^2}{z^2}\right)\right) \qquad \frac{1}{b^2e^{2\ i\ p}}V_o a^2\,\frac{Q}{}$$

$$a_{11} \qquad \frac{1}{b^2e^{2\ i\ p}}V_o a^2\,\frac{Q}{}$$

Para a_{12}

$$f\,z \qquad \frac{1}{2}i\,\frac{Q}{^2\left(z-be^{i\ p}\right)}\,\frac{}{z}$$

$$Res \quad \lim_{z\ 0}\left(\ z-0\ \left(\frac{1}{2}i\,\frac{Q}{^2\left(z-be^{i\ p}\right)}\,\frac{}{z}\right)\right) \qquad -\frac{1}{2}\,\frac{i}{be^{i\ p}}\,\frac{Q}{2}$$

$$a_{12} \qquad -\frac{1}{2}\,\frac{i}{be^{i\ p}}\,\frac{Q}{2}$$

Para a_{13}

$$f\,z \qquad \frac{1}{2}\,\frac{Q^2}{^2\left(z-be^{i\ p}\right)}\,\frac{b}{zb-a^2e^{i\ p}}$$

$$Res \quad \lim_{z \to \frac{a^2 e^{i\,p}}{b}} \left(\left(z - \frac{a^2 e^{i\,p}}{b} \right) \left(\frac{1}{2} \frac{Q^2}{^2(z-be^{i\,p})} \frac{b}{zb-a^2e^{i\,p}} \right) \right) \qquad \frac{1}{2e^{i\,p}\,a^2-b^2} \frac{Q^2}{2} b$$

$$a_{13} \qquad \frac{1}{2e^{i\,p}\,a^2-b^2} \frac{Q^2}{2} b$$

Para a_{14}

$$f\,z \qquad -\frac{Q^2}{^2(z-be^{i\,p})z}$$

$$Res \quad \lim_{z \to 0} \left(z - 0 \left(-\frac{Q^2}{^2(z-be^{i\,p})z} \right) \right) \qquad \frac{1}{be^{i\,p}} \frac{Q^2}{2}$$

$$a_{14} \qquad \frac{1}{be^{i\,p}} \frac{Q^2}{2}$$

Para a_{15}

$$f\,z \qquad \frac{1}{2} \frac{Q^2}{^2(z-be^{i\,p})(z-be^{i\,n})}$$

$$a_{15} \qquad 0$$

Para a_{16}

$$f\,z \qquad \frac{1}{2} \frac{Q^2}{^2(z-be^{i\,p})} \frac{b}{zb-a^2e^{i\,n}}$$

$$Res \quad \lim_{z \to \frac{a^2 e^{i\,n}}{b}} \left(\left(z - \frac{a^2 e^{i\,n}}{b} \right) \left(\frac{1}{2} \frac{Q^2}{^2(z-be^{i\,p})} \frac{b}{zb-a^2e^{i\,n}} \right) \right) \qquad \frac{1}{2(a^2e^{i\,n}-e^{i\,p}b^2)} \frac{Q^2}{2} b$$

$$a_{16} \qquad \frac{1}{2(a^2e^{i\,n}-e^{i\,p}b^2)} \frac{Q^2}{2} b$$

Para a_{17}

$$f\,z \qquad Q\frac{b}{(zb-a^2e^{i\,p})} V_o$$

$$Res \quad \lim_{z \to \frac{a^2 e^{i\,p}}{b}} \left(\left(z - \frac{a^2 e^{i\,p}}{b} \right) \left(Q\frac{b}{(zb-a^2e^{i\,p})} V_o \right) \right) \qquad \frac{Q}{} V_o$$

$$a_{17} \quad \underline{Q} \, V_o$$

Para a_{18}

$$f \, z \quad -Q\frac{b}{(zb-a^2e^{i\,p})}V_o\frac{a^2}{z^2}$$

$$Res_1 \quad \lim_{z \;\; \frac{a^2e^{i\,p}}{b}} \left(\left(z - \frac{a^2e^{i\,p}}{b}\right)\left(-Q\frac{b}{(zb-a^2e^{i\,p})}V_o\frac{a^2}{z^2}\right)\right) \quad\quad -\frac{b^2}{a^2e^{2\,i\,p}}\underline{Q}\,V_o$$

$$Res_2 \quad \frac{1}{2-1\,!}\lim_{z\;\;0}\frac{d^{2-1}}{dz^{2-1}}\left(z-0^{\,2}\left(-Q\frac{b}{(zb-a^2e^{i\,p})}V_o\frac{a^2}{z^2}\right)\right) \quad\quad \frac{b^2}{a^2e^{2\,i\,p}}\underline{Q}\,V_o$$

$$a_{18} \quad Res_1 \quad Res_2 \quad 0$$

Para a_{19}

$$f \, z \quad \tfrac{1}{2}iQ\frac{b}{^2(zb-a^2e^{i\,p})}\,\overline{z}$$

$$Res_1 \quad \lim_{z \;\; \frac{a^2e^{i\,p}}{b}} \left(\left(z - \frac{a^2e^{i\,p}}{b}\right)\left(\tfrac{1}{2}iQ\frac{b}{^2(zb-a^2e^{i\,p})}\,\overline{z}\right)\right) \quad\quad \tfrac{1}{2}\frac{i}{a^2e^{i\,p}}Q\frac{b}{2}$$

$$Res_2 \quad \lim_{z\;\;0}\left(z-0\left(\tfrac{1}{2}iQ\frac{b}{^2(zb-a^2e^{i\,p})}\,\overline{z}\right)\right) \quad\quad -\tfrac{1}{2}\frac{i}{a^2e^{i\,p}}Q\frac{b}{2}$$

$$a_{19} \quad Res_1 \quad Res_2 \quad 0$$

Para a_{20}

$$f \, z \quad \tfrac{1}{4}Q^2\frac{b^2}{^2(zb-a^2e^{i\,p})^2}$$

$$Res \quad \frac{1}{2-1\,!}\lim_{z\;\;\frac{a^2e^{i\,p}}{b}}\frac{d^{2-1}}{dz^{2-1}}\left(\left(z-\frac{a^2e^{i\,p}}{b}\right)^2\left(\tfrac{1}{4}Q^2\frac{b^2}{^2(zb-a^2e^{i\,p})^2}\right)\right) \quad\quad 0$$

$$a_{20} \quad 0$$

Para a_{21}

$$f\,z \quad -Q^2\,\frac{b}{2\,(zb-a^2e^{i\ p}\,)z}$$

$$Res_1 \quad \lim_{z\ \ \frac{a^2e^{i\ p}}{b}}\left(\left(z-\frac{a^2e^{i\ p}}{b}\right)\left(-Q^2\,\frac{b}{2\,(zb-a^2e^{i\ p}\,)z}\right)\right) \quad -\frac{1}{a^2e^{i\ p}}Q^2\,\frac{b}{2}$$

$$Res_2 \quad \lim_{z\ 0}\left(z-0\left(-Q^2\,\frac{b}{2\,(zb-a^2e^{i\ p}\,)z}\right)\right) \quad \frac{1}{a^2e^{i\ p}}Q^2\,\frac{b}{2}$$

$$a_{21} \quad Res_1 \quad Res_2 \quad 0$$

Para a_{22}

$$f\,z \quad \frac{1}{2}Q^2\,\frac{b}{2\,(zb-a^2e^{i\ p}\,)(z-be^{i\ n}\,)}$$

$$Res \quad \lim_{z\ \ \frac{a^2e^{i\ p}}{b}}\left(\left(z-\frac{a^2e^{i\ p}}{b}\right)\left(\frac{1}{2}Q^2\,\frac{b}{2\,(zb-a^2e^{i\ p}\,)(z-be^{i\ n}\,)}\right)\right) \quad \frac{1}{2\,(a^2e^{i\ p}-b^2e^{i\ n}\,)}Q^2\,\frac{b}{2}$$

$$a_{22} \quad \frac{1}{2\,(a^2e^{i\ p}-b^2e^{i\ n}\,)}Q^2\,\frac{b}{2}$$

Para a_{23}

$$f\,z \quad \frac{1}{2}Q^2\,\frac{b^2}{2\,(zb-a^2e^{i\ p}\,)(zb-a^2e^{i\ n}\,)}$$

$$Res_1 \quad \lim_{z\ \ \frac{a^2e^{i\ p}}{b}}\left(\left(z-\frac{a^2e^{i\ p}}{b}\right)\left(\frac{1}{2}Q^2\,\frac{b^2}{2\,(zb-a^2e^{i\ p}\,)(zb-a^2e^{i\ n}\,)}\right)\right) \quad \frac{1}{2}\,\frac{b}{a^2\,(e^{i\ p}-e^{i\ n}\,)}\,\frac{Q^2}{2}$$

$$Res_2 \quad \lim_{z\ \ \frac{a^2e^{i\ n}}{b}}\left(\left(z-\frac{a^2e^{i\ n}}{b}\right)\left(\frac{1}{2}Q^2\,\frac{b^2}{2\,(zb-a^2e^{i\ p}\,)(zb-a^2e^{i\ n}\,)}\right)\right) \quad -\frac{1}{2}\,\frac{b}{a^2\,(e^{i\ p}-e^{i\ n}\,)}\,\frac{Q^2}{2}$$

$$a_{23} \quad Res_1 \quad Res_2 \quad 0$$

Para a_{24}

$$f\,z \quad \frac{Q}{(z-be^{i\ n}\,)}V_o$$

$$a_{24} \quad 0$$

Para a_{25}

$$f\,z \quad -\frac{Q}{(z-be^{i\ n})}V_o\frac{a^2}{z^2}$$

$$Res \quad \frac{1}{2-1\ !}\lim_{z\ 0}\frac{d^{2-1}}{dz^{2-1}}\left(\ z-0\ ^2\left(-\frac{Q}{(z-be^{i\ n})}V_o\frac{a^2}{z^2}\right)\right) \quad \frac{1}{b^2e^{2\ i\ n}}\frac{Q}{}V_oa^2$$

$$a_{25} \quad \frac{1}{b^2e^{2\ i\ n}}\frac{Q}{}V_oa^2$$

Para a_{26}

$$f\,z \quad \frac{1}{2}i\frac{Q}{^2(z-be^{i\ n})}\frac{}{z}$$

$$Res \quad \lim_{z\ 0}\left(\ z-0\ \left(\frac{1}{2}i\frac{Q}{^2(z-be^{i\ n})}\frac{}{z}\right)\right) \quad -\frac{1}{2}\frac{i}{be^{i\ n}}\frac{Q}{2}$$

$$a_{26} \quad -\frac{1}{2}\frac{i}{be^{i\ n}}\frac{Q}{2}$$

Para a_{27}

$$f\,z \quad -\frac{Q^2}{^2(z-be^{i\ n})z}$$

$$Res \quad \lim_{z\ 0}\left(\ z-0\ \left(-\frac{Q^2}{^2(z-be^{i\ n})z}\right)\right) \quad \frac{1}{be^{i\ n}}\frac{Q^2}{2}$$

$$a_{27} \quad \frac{1}{be^{i\ n}}\frac{Q^2}{2}$$

Para a_{28}

$$f\,z \quad \frac{1}{2}\frac{Q^2}{^2(z-be^{i\ n})}\frac{b}{zb-a^2e^{i\ n}}$$

$$Res \quad \lim_{z\ \frac{a^2e^{i\ n}}{b}}\left(\left(z-\frac{a^2e^{i\ n}}{b}\right)\left(\frac{1}{2}\frac{Q^2}{^2(z-be^{i\ n})}\frac{b}{zb-a^2e^{i\ n}}\right)\right) \quad \frac{1}{2e^{i\ n}}\frac{1}{a^2-b^2}\frac{Q^2}{2}b$$

$$a_{28} \quad \frac{1}{2e^{i\ n}}\frac{1}{a^2-b^2}\frac{Q^2}{2}b$$

Para a_{29}

$$f\ z \qquad Q\frac{b}{(zb-a^2e^{i\ n})}V_o$$

$$Res \quad \lim_{z\ \frac{a^2e^{i\ n}}{b}} \left(\left(z-\frac{a^2e^{i\ n}}{b}\right)\left(Q\frac{b}{(zb-a^2e^{i\ n})}V_o\right)\right) \qquad \frac{Q}{}V_o$$

$$a_{29} \qquad \frac{Q}{}V_o$$

Para a_{30}

$$f\ z \qquad -Q\frac{b}{(zb-a^2e^{i\ n})}V_o\frac{a^2}{z^2}$$

$$Res_1 \quad \lim_{z\ \frac{a^2e^{i\ n}}{b}} \left(\left(z-\frac{a^2e^{i\ n}}{b}\right)\left(-Q\frac{b}{(zb-a^2e^{i\ n})}V_o\frac{a^2}{z^2}\right)\right) \qquad -\frac{b^2}{a^2e^{2\ i\ n}}\frac{Q}{}V_o$$

$$Res_2 \quad \frac{1}{2-1\ !}\lim_{z\ 0}\frac{d^{2-1}}{dz^{2-1}}\left(\ z-0\ ^2\left(-Q\frac{b}{(zb-a^2e^{i\ n})}V_o\frac{a^2}{z^2}\right)\right) \qquad \frac{b^2}{a^2e^{2\ i\ n}}\frac{Q}{}V_o$$

$$a_{30} \quad Res_1 \quad Res_2 \quad 0$$

Para a_{31}

$$f\ z \qquad \frac{1}{2}iQ\frac{b}{^2(zb-a^2e^{i\ n})}\ \frac{}{z}$$

$$Res_1 \quad \lim_{z\ \frac{a^2e^{i\ n}}{b}} \left(\left(z-\frac{a^2e^{i\ n}}{b}\right)\left(\frac{1}{2}iQ\frac{b}{^2(zb-a^2e^{i\ n})}\ \frac{}{z}\right)\right) \qquad \frac{1}{2}\frac{i}{a^2e^{i\ n}}Q\frac{b}{2}$$

$$Res_2 \quad \lim_{z\ 0}\left(\ z-0\ \left(\frac{1}{2}iQ\frac{b}{^2(zb-a^2e^{i\ n})}\ \frac{}{z}\right)\right) \qquad -\frac{1}{2}\frac{i}{a^2e^{i\ n}}Q\frac{b}{2}$$

$$a_{31} \quad Res_1 \quad Res_2 \quad 0$$

Para a_{32}

$$f\ z \qquad -Q^2\frac{b}{^2(zb-a^2e^{i\ n})z}$$

$$Res_1 \quad \lim_{z \to \frac{a^2 e^{i n}}{b}} \left(\left(z - \frac{a^2 e^{i n}}{b} \right) \left(-Q^2 \frac{b}{2(zb - a^2 e^{i n})z} \right) \right) \quad - \frac{1}{a^2 e^{i n}} Q^2 \frac{b}{2}$$

$$Res_2 \quad \lim_{z \to 0} \left(z - 0 \left(-Q^2 \frac{b}{2(zb - a^2 e^{i n})z} \right) \right) \quad \frac{1}{a^2 e^{i n}} Q^2 \frac{b}{2}$$

$$a_{32} \quad Res_1 \quad Res_2 \quad 0$$

Para a_{33}

$$f z \quad \frac{1}{4} Q^2 \frac{b^2}{2(zb - a^2 e^{i n})^2}$$

$$Res \quad \frac{1}{2-1 \,!} \lim_{z \to \frac{a^2 e^{i n}}{b}} \frac{d^{2-1}}{dz^{2-1}} \left(\left(z - \frac{a^2 e^{i n}}{b} \right)^2 \left(\frac{1}{4} Q^2 \frac{b^2}{2(zb - a^2 e^{i n})^2} \right) \right) \quad 0$$

$$a_{33} \quad 0$$

Para a_{34}

$$f z \quad iV_o \frac{}{z}$$

$$Res \quad \lim_{z \to 0} \quad z - 0 \quad iV_o \frac{}{z} \quad iV_o -$$

$$a_{34} \quad iV_o -$$

Para a_{35}

$$f z \quad -2V_o \frac{Q}{z}$$

$$Res \quad \lim_{z \to 0} \left(z - 0 \left(-2V_o \frac{Q}{z} \right) \right) \quad -2 \frac{Q}{} V_o$$

$$a_{35} \quad -2 \frac{Q}{} V_o$$

Para a_{36}

$$f z \quad V_o^2$$

$$a_{36} \quad 0$$

Modelo SZ-III

$$\frac{dF\,z}{dz} \quad V_o - V_o\frac{a^2}{z^2} \quad \frac{1}{2}i\frac{}{z} \quad \frac{1}{2}\frac{Q}{(z-be^{i\,ab})} \quad \frac{1}{2}Q\frac{b}{(zb-a^2e^{i\,ab})} - \frac{1}{2}\frac{Q}{z} \quad \frac{1}{2}i\frac{1}{(z-R_1e^{i\,p})}$$

$$\frac{1}{2}i\quad 1\frac{R_1}{(zR_1-a^2e^{i\,n})} - \frac{1}{2}i\frac{1}{(z-R_1e^{i\,n})} - \frac{1}{2}i\quad 1\frac{R_1}{(zR_1-a^2e^{i\,p})} \quad \frac{1}{2}i\frac{2}{(z\,R_2e^{i\,n})} \quad \frac{1}{2}i\quad 2\frac{R_2}{(zR_2\,a^2e^{i\,p})}$$

$$- \frac{1}{2}i\frac{2}{(z\,R_2e^{i\,p})} - \frac{1}{2}iR_2\frac{2}{(zR_2\,a^2e^{i\,n})}$$

$$\left(\frac{dF\,z}{dz}\right)^2 \quad V_o^2\frac{a^4}{z^4} - i\frac{2}{(z\,R_2e^{i\,p})}V_o - \frac{1}{2}i\frac{}{2z^2}Q \quad V_o$$

$$\frac{a^2}{z^3}\,Q - iV_o\frac{a^2}{z^3} - \quad V_o^2 - 2V_o^2\frac{a^2}{z^2} \quad \frac{1}{4}\frac{Q^2}{{}^2(z-be^{i\,ab})^2} - \frac{1}{2}i\frac{Q}{{}^2(z-be^{i\,ab})}R_2\frac{2}{zR_2\,a^2e^{i\,n}}$$

$$Q\frac{b}{(zb-a^2e^{i\,ab})}V_o \quad \frac{1}{2}iQ\frac{b}{{}^2(zb-a^2e^{i\,ab})}\,z \quad \frac{1}{4}Q^2\frac{b^2}{{}^2(zb-a^2e^{i\,ab})^2} - \frac{1}{2}i\frac{Q}{{}^2(z-be^{i\,ab})}$$

$$\frac{2}{z\,R_2e^{i\,p}} - \frac{1}{2}i\frac{Q}{{}^2(z-be^{i\,ab})}\frac{1}{z-R_1e^{i\,n}} - \frac{1}{2}i\frac{Q}{{}^2(z-be^{i\,ab})}\quad 1\frac{R_1}{zR_1-a^2e^{i\,p}} \quad \frac{1}{2}i\frac{Q}{{}^2(z-be^{i\,ab})}\quad 1\frac{R_1}{zR_1-a^2e^{i\,n}}$$

$$\frac{1}{2}i\frac{Q}{{}^2(z-be^{i\,ab})}\frac{2}{z\,R_2e^{i\,n}} \quad \frac{1}{2}i\frac{Q}{{}^2(z-be^{i\,ab})}\quad 2\frac{R_2}{zR_2\,a^2e^{i\,p}} \quad \frac{1}{2}\frac{Q^2}{{}^2(z-be^{i\,ab})}\frac{b}{zb-a^2e^{i\,ab}} -$$

$$\frac{1}{2}\frac{Q^2}{{}^2(z-be^{i\,ab})z} \quad \frac{1}{2}i\frac{Q}{{}^2(z-be^{i\,ab})}\frac{1}{z-R_1e^{i\,p}} \quad \frac{Q}{(z-be^{i\,ab})}V_o - \frac{Q}{(z-be^{i\,ab})}$$

$$V_o\frac{a^2}{z^2} \quad \frac{1}{2}i\frac{Q}{{}^2(z-be^{i\,ab})}\frac{}{z} \quad \frac{1}{2}iQ\frac{b}{{}^2(zb-a^2e^{i\,ab})}\quad 1\frac{R_1}{zR_1-a^2e^{i\,n}} - \frac{1}{2}iQ\frac{b}{{}^2(zb-a^2e^{i\,ab})}$$

$$1\frac{R_1}{zR_1-a^2e^{i\,p}} \quad \frac{1}{2}iQ\frac{b}{{}^2(zb-a^2e^{i\,ab})}\frac{2}{z\,R_2e^{i\,n}} - \frac{1}{2}Q^2\frac{b}{{}^2(zb-a^2e^{i\,ab})z} \quad \frac{1}{2}iQ\frac{b}{{}^2(zb-a^2e^{i\,ab})}\frac{1}{z-R_1e^{i\,p}} - Q$$

$$\frac{b}{(zb-a^2e^{i\,ab})}V_o\frac{a^2}{z^2} - \frac{1}{2}iQ\frac{b}{{}^2(zb-a^2e^{i\,ab})}\frac{1}{z-R_1e^{i\,n}} \quad \frac{1}{2}iQ\frac{b}{{}^2(zb-a^2e^{i\,ab})}\quad 2$$

$$\frac{R_2}{zR_2\,a^2e^{i\,p}} - \frac{1}{2}iQ\frac{b}{{}^2(zb-a^2e^{i\,ab})}\frac{2}{z\,R_2e^{i\,p}} - \frac{1}{2}iQ\frac{b}{{}^2(zb-a^2e^{i\,ab})}R_2\frac{2}{zR_2\,a^2e^{i\,n}} \quad \frac{1}{4}\frac{Q^2}{{}^2z^2} - \frac{1}{2}\frac{2}{{}^2(z-R_1e^{i\,p})}$$

$$\frac{R_1}{zR_1-a^2e^{i\,n}} \quad \frac{1}{2}\frac{2}{{}^2(z-R_1e^{i\,p})(z-R_1e^{i\,n})} - \frac{1}{2}i\frac{2}{{}^2(z-R_1e^{i\,p})}\frac{Q}{z} \quad i\frac{1}{(z-R_1e^{i\,p})}$$

$$V_o - i\frac{1}{(z-R_1e^{i\,p})}V_o\frac{a^2}{z^2} - \frac{1}{2}\frac{1}{{}^2(z-R_1e^{i\,p})}\frac{}{z} - \frac{1}{4}\frac{2}{{}^2(z-R_1e^{i\,p})^2} - \frac{1}{2}\frac{1}{{}^2(z-R_1e^{i\,p})}$$

$$\frac{2}{z\,R_2e^{i\,n}} \quad \frac{1}{2}\frac{2}{{}^2(z-R_1e^{i\,p})}\frac{R_1}{zR_1-a^2e^{i\,p}} - \frac{1}{4}\frac{2}{{}^2(z-R_1e^{i\,n})^2} - \frac{1}{2}i\quad 1\frac{R_1}{{}^2(zR_1-a^2e^{i\,n})}$$

$$\frac{Q}{z} - \frac{1}{2}\quad 1\frac{R_1}{{}^2(zR_1-a^2e^{i\,n})}\frac{}{z} \quad i\quad 1\frac{R_1}{(zR_1-a^2e^{i\,n})}V_o - i\quad 1\frac{R_1}{(zR_1-a^2e^{i\,n})}V_o\frac{a^2}{z^2} \quad \frac{1}{2}\frac{1}{{}^2(z-R_1e^{i\,p})}$$

$$R_2\frac{2}{zR_2\,a^2e^{i\,n}} \quad \frac{1}{2}\frac{1}{{}^2(z-R_1e^{i\,p})}\frac{2}{z\,R_2e^{i\,p}} - \frac{1}{2}\frac{1}{{}^2(z-R_1e^{i\,n})}\quad 2\frac{R_2}{zR_2\,a^2e^{i\,p}} - \frac{1}{4}$$

$$\frac{2}{{}^2z^2} \quad \frac{1}{2}\quad 2\frac{R_1}{{}^2(zR_1-a^2e^{i\,n})(z-R_1e^{i\,n})} - \frac{1}{4}\quad 2\frac{R_1^2}{{}^2(zR_1-a^2e^{i\,n})^2} \quad \frac{1}{2}\quad 2\frac{R_1^2}{{}^2(zR_1-a^2e^{i\,n})(zR_1-a^2e^{i\,p})} -$$

$$\frac{1}{2}\quad 1\frac{R_1}{{}^2(zR_1-a^2e^{i\,n})}\frac{2}{z\,R_2e^{i\,n}} \quad \frac{1}{2}\quad 1\frac{R_1}{{}^2(zR_1-a^2e^{i\,n})}R_2\frac{2}{zR_2\,a^2e^{i\,n}} \quad \frac{1}{2}\quad 1\frac{R_1}{{}^2(zR_1-a^2e^{i\,n})}\frac{2}{z\,R_2e^{i\,p}} - i$$

$$\frac{1}{(z-R_1e^{i\,n})}V_o - \frac{1}{2}\quad 1\frac{R_1}{{}^2(zR_1-a^2e^{i\,n})}\quad 2\frac{R_2}{zR_2\,a^2e^{i\,p}} - \frac{1}{2}\frac{2}{{}^2(z-R_1e^{i\,n})}\frac{R_1}{zR_1-a^2e^{i\,p}}$$

$$\frac{1}{2}\frac{1}{{}^2(z-R_1e^{i\,n})}\frac{2}{z\,R_2e^{i\,n}} \quad \frac{1}{2}i\frac{1}{{}^2(z-R_1e^{i\,n})}\frac{Q}{z} \quad i\frac{1}{(z-R_1e^{i\,n})}V_o\frac{a^2}{z^2} \quad \frac{1}{2}\frac{1}{{}^2(z-R_1e^{i\,n})}$$

$$\frac{}{z} \quad \frac{1}{2}i\quad 1\frac{R_1}{{}^2(zR_1-a^2e^{i\,p})}\frac{Q}{z} \quad \frac{1}{2}\quad 1\frac{R_1}{{}^2(zR_1-a^2e^{i\,p})}\frac{}{z} \quad i\quad 1\frac{R_1}{(zR_1-a^2e^{i\,p})}V_o\frac{a^2}{z^2} - \frac{1}{2}\frac{1}{{}^2(z-R_1e^{i\,n})}$$

$$R_2\frac{2}{zR_2\,a^2e^{i\,n}} - i\quad 1\frac{R_1}{(zR_1-a^2e^{i\,p})}V_o \quad \frac{1}{2}\frac{1}{{}^2(z-R_1e^{i\,n})}\quad 2\frac{R_2}{zR_2\,a^2e^{i\,p}} -$$

$$\frac{1}{2}\frac{1}{{}^2(z-R_1e^{i\,n})}\frac{2}{z\,R_2e^{i\,p}} - \frac{1}{2}i\frac{2}{{}^2(z\,R_2e^{i\,n})}\frac{Q}{z} - i\frac{2}{(z\,R_2e^{i\,n})}V_o\frac{a^2}{z^2} - \frac{1}{2}\quad 1\frac{R_1}{{}^2(zR_1-a^2e^{i\,p})}$$

$$\frac{2}{z\,R_2e^{i\,p}} - \frac{1}{2}\quad 1\frac{R_1}{{}^2(zR_1-a^2e^{i\,p})}R_2\frac{2}{zR_2\,a^2e^{i\,n}} - \frac{1}{4}\quad 2\frac{R_1^2}{{}^2(zR_1-a^2e^{i\,p})^2} \quad \frac{1}{2}\quad 1\frac{R_1}{{}^2(zR_1-a^2e^{i\,p})}\frac{2}{z\,R_2e^{i\,n}} \quad \frac{1}{2}$$

$$1 \frac{R_1}{2(zR_1-a^2e^{i\ p})} \quad 2 \frac{R_2}{zR_2\ a^2e^{i\ p}} \quad i \frac{2}{(z\ R_2e^{i\ n})} V_o - \frac{1}{2} \frac{2}{2(z\ R_2e^{i\ n})} z - \frac{1}{4} \frac{2}{2(z\ R_2e^{i\ n})^2} - \frac{1}{2} \frac{2}{2(z\ R_2e^{i\ n})}$$

$$\frac{R_2}{zR_2\ a^2e^{i\ p}} \quad \frac{1}{2} \frac{2}{2(z\ R_2e^{i\ n})(z\ R_2e^{i\ p})} \quad \frac{1}{2} \frac{2}{2(z\ R_2e^{i\ n})} \frac{R_2}{zR_2\ a^2e^{i\ n}} \quad \frac{1}{2} i \frac{2}{2(z\ R_2e^{i\ p})}$$

$$\frac{Q}{z} \quad i \frac{2}{(z\ R_2e^{i\ p})} V_o \frac{a^2}{z^2} \quad \frac{1}{2} \frac{2}{2(z\ R_2e^{i\ p})} z - \frac{1}{4} \frac{2}{2(z\ R_2e^{i\ p})^2} - \frac{1}{4} \frac{2}{2} \frac{R_2^2}{2(zR_2\ a^2e^{i\ p})^2}$$

$$\frac{1}{2} \frac{2}{2} \frac{R_2}{2(zR_2\ a^2e^{i\ p})(z\ R_2e^{i\ p})} \quad \frac{1}{2} \frac{2}{2} \frac{R_2^2}{2(zR_2\ a^2e^{i\ p})(zR_2\ a^2e^{i\ n})} -$$

$$\frac{1}{2} i \quad 2 \frac{R_2}{2(zR_2\ a^2e^{i\ p})} \frac{Q}{z} \quad i \quad 2 \frac{R_2}{(zR_2\ a^2e^{i\ p})} V_o - i \quad 2 \frac{R_2}{(zR_2\ a^2e^{i\ p})} V_o \frac{a^2}{z^2} - \frac{1}{2} \quad 2 \frac{R_2}{2(zR_2\ a^2e^{i\ p})}$$

$$z - \frac{1}{2} \frac{2}{2(z\ R_2e^{i\ p})} \frac{R_2}{zR_2\ a^2e^{i\ n}} - iR_2 \frac{2}{(zR_2\ a^2e^{i\ n})} V_o \quad iR_2 \frac{2}{(zR_2\ a^2e^{i\ n})}$$

$$V_o \frac{a^2}{z^2} \quad \frac{1}{2} R_2 \frac{2}{2(zR_2\ a^2e^{i\ n})} z \quad iV_o \frac{1}{z} - V_o \frac{Q}{z} - \frac{1}{4} R_2^2 \frac{2}{2(zR_2\ a^2e^{i\ n})^2} \quad \frac{1}{2} iR_2 \frac{2}{2(zR_2\ a^2e^{i\ n})} \frac{Q}{z}$$

Para a_1

$$f\ z \quad V_o^2 \frac{a^4}{z^4}$$

$$Res \quad \frac{1}{4-1\ !} \lim_{z\ 0} \frac{d^{4-1}}{dz^{4-1}} \left(z - 0\ ^4 \left(V_o^2 \frac{a^4}{z^4} \right) \right) \quad 0$$

$$a_1 \quad 0$$

Para a_2

$$f\ z \quad -i \frac{2}{(z\ R_2e^{i\ p})} V_o$$

$$a_2 \quad 0$$

Para a_3

$$f\ z \quad -\frac{1}{2} i \frac{}{2z^2} Q$$

$$Res \quad \frac{1}{2-1\ !} \lim_{z\ 0} \frac{d^{2-1}}{dz^{2-1}} \left(z - 0\ ^2 \left(-\frac{1}{2} i \frac{}{2z^2} Q \right) \right) \quad 0$$

$$a_3 \quad 0$$

Para a_4

$$f\ z \quad V_o \frac{a^2}{z^3} \frac{Q}{}$$

$$Res \quad \frac{1}{3-1\ !}\lim_{z\ 0}\frac{d^{3-1}}{dz^{3-1}}\left(\ z-0\ ^3\left(V_o\frac{a^2}{z^3}\frac{Q}{}\right)\right) \quad 0$$

$$a_4 \quad 0$$

Para a_5

$$f\ z \quad -iV_o\frac{a^2}{z^3}-$$

$$Res \quad \frac{1}{3-1\ !}\lim_{z\ 0}\frac{d^{3-1}}{dz^{3-1}}\left(\ z-0\ ^3\left(-iV_o\frac{a^2}{z^3}-\right)\right) \quad 0$$

$$a_5 \quad 0$$

Para a_6

$$f\ z \quad V_o^2$$

$$a_6 \quad 0$$

Para a_7

$$f\ z \quad -2V_o^2\frac{a^2}{z^2}$$

$$Res \quad \frac{1}{2-1\ !}\lim_{z\ 0}\frac{d^{2-1}}{dz^{2-1}}\left(\ z-0\ ^2\left(-2V_o^2\frac{a^2}{z^2}\right)\right) \quad 0$$

$$a_7 \quad 0$$

Para a_8

$$f\ z \quad \frac{1}{4}\frac{Q^2}{^2\left(z-be^{i\ ab}\right)^2}$$

$$a_8 \quad 0$$

Para a_9

$$f\ z = -\frac{1}{2}i\frac{Q}{2\left(z-be^{i\ ab}\right)}R_2\frac{2}{zR_2\ a^2e^{i\ n}}$$

$$Res_1 = \lim_{z\ -\frac{a^2e^{i\ n}}{R_2}}\left(\left(z\ \frac{a^2e^{i\ n}}{R_2}\right)\left(-\frac{1}{2}i\frac{Q}{2\left(z-be^{i\ ab}\right)}R_2\frac{2}{zR_2\ a^2e^{i\ n}}\right)\right)\quad \frac{1}{2}\frac{i}{a^2e^{i\ n}\ be^{i\ ab}R_2}\frac{Q}{2}R_2\ 2$$

$$a_9 = \frac{1}{2}\frac{i}{a^2e^{i\ n}\ be^{i\ ab}R_2}\frac{Q}{2}R_2\ 2$$

Para a_{10}

$$f\ z = Q\frac{b}{\left(zb-a^2e^{i\ ab}\right)}V_o$$

$$Res = \lim_{z\ \frac{a^2e^{i\ ab}}{b}}\left(\left(z-\frac{a^2e^{i\ ab}}{b}\right)\left(Q\frac{b}{\left(zb-a^2e^{i\ ab}\right)}V_o\right)\right)\quad \frac{Q}{2}V_o$$

$$a_{10}\quad \frac{Q}{2}V_o$$

Para a_{11}

$$f\ z = \frac{1}{2}iQ\frac{b}{2\left(zb-a^2e^{i\ ab}\right)}\ z$$

$$Res_1 = \lim_{z\ \frac{a^2e^{i\ ab}}{b}}\left(\left(z-\frac{a^2e^{i\ ab}}{b}\right)\left(\frac{1}{2}iQ\frac{b}{2\left(zb-a^2e^{i\ ab}\right)}\ z\right)\right)\quad \frac{1}{2}\frac{i}{a^2e^{i\ ab}}Q\frac{b}{2}$$

$$Res_2 = \lim_{z\ 0}\left(z-0\left(\frac{1}{2}iQ\frac{b}{2\left(zb-a^2e^{i\ ab}\right)}\ z\right)\right)\quad -\frac{1}{2}\frac{i}{a^2e^{i\ ab}}Q\frac{b}{2}$$

$$a_{11}\quad Res_1\quad Res_2\quad 0$$

Para a_{12}

$$f\ z = \frac{1}{4}Q^2\frac{b^2}{2\left(zb-a^2e^{i\ ab}\right)^2}$$

$$Res = \frac{1}{2-1\ !}\lim_{z\ \frac{a^2e^{i\ ab}}{b}}\frac{d^{2-1}}{dz^{2-1}}\left(\left(z-\frac{a^2e^{i\ ab}}{b}\right)^2\left(\frac{1}{4}Q^2\frac{b^2}{2\left(zb-a^2e^{i\ ab}\right)^2}\right)\right)\quad 0$$

$$a_{12}\quad 0$$

Para a_{13}

$$f(z) = -\frac{1}{2}i\frac{Q}{2(z-be^{i\,ab})}\frac{2}{z\,R_2e^{i\,p}}$$

$$a_{13} = 0$$

Para a_{14}

$$f(z) = -\frac{1}{2}i\frac{Q}{2(z-be^{i\,ab})}\frac{1}{z-R_1e^{i\,n}}$$

$$a_{14} = 0$$

Para a_{15}

$$f(z) = -\frac{1}{2}i\frac{Q}{2(z-be^{i\,ab})}\frac{1}{zR_1-a^2e^{i\,p}}$$

$$Res = \lim_{z \to \frac{a^2e^{i\,p}}{R_1}}\left(\left(z - \frac{a^2e^{i\,p}}{R_1}\right)\left(-\frac{1}{2}i\frac{Q}{2(z-be^{i\,ab})}\frac{1}{zR_1-a^2e^{i\,p}}\right)\right) = \frac{1}{2}\frac{i}{-a^2e^{i\,p}-be^{i\,ab}R_1}\frac{Q}{2}\frac{1}{R_1}$$

$$a_{15} = \frac{1}{2}\frac{i}{-a^2e^{i\,p}-be^{i\,ab}R_1}\frac{Q}{2}\frac{1}{R_1}$$

Para a_{16}

$$f(z) = \frac{1}{2}i\frac{Q}{2(z-be^{i\,ab})}\frac{1}{zR_1-a^2e^{i\,n}}$$

$$Res = \lim_{z \to \frac{a^2e^{i\,n}}{R_1}}\left(\left(z - \frac{a^2e^{i\,n}}{R_1}\right)\left(\frac{1}{2}i\frac{Q}{2(z-be^{i\,ab})}\frac{1}{zR_1-a^2e^{i\,n}}\right)\right) = \frac{1}{2}\frac{i}{a^2e^{i\,n}-be^{i\,ab}R_1}\frac{Q}{2}\frac{1}{R_1}$$

$$a_{16} = \frac{1}{2}\frac{i}{a^2e^{i\,n}-be^{i\,ab}R_1}\frac{Q}{2}\frac{1}{R_1}$$

Para a_{17}

$$f(z) = \frac{1}{2}i\frac{Q}{2(z-be^{i\,ab})}\frac{2}{z\,R_2e^{i\,n}}$$

$$a_{17} \quad 0$$

Para a_{18}

$$f z \quad \frac{1}{2}i\frac{Q}{2\left(z-be^{i\ ab}\right)} \quad 2\frac{R_2}{zR_2\ a^2e^{i\ p}}$$

$$Res \quad \lim_{z \ -\frac{a^2e^{i\ p}}{R_2}}\left(\left(z \quad \frac{a^2e^{i\ p}}{R_2}\right)\left(\frac{1}{2}i\frac{Q}{2\left(z-be^{i\ ab}\right)} \quad 2\frac{R_2}{zR_2\ a^2e^{i\ p}}\right)\right) \quad -\frac{1}{2}\frac{i}{a^2e^{i\ p}\ be^{i\ ab}R_2}\frac{Q}{2} \quad 2R_2$$

$$a_{18} \quad -\frac{1}{2}\frac{i}{a^2e^{i\ p}\ be^{i\ ab}R_2}\frac{Q}{2} \quad 2R_2$$

Para a_{19}

$$f z \quad \frac{1}{2}\frac{Q^2}{2\left(z-be^{i\ ab}\right)}\frac{b}{zb-a^2e^{i\ ab}}$$

$$Res \quad \lim_{z \ \frac{a^2e^{i\ ab}}{b}}\left(\left(z - \frac{a^2e^{i\ ab}}{b}\right)\left(\frac{1}{2}\frac{Q^2}{2\left(z-be^{i\ ab}\right)}\frac{b}{zb-a^2e^{i\ ab}}\right)\right) \quad -\frac{1}{2e^{i\ ab}\ -a^2\ b^2}\frac{Q^2}{2}b$$

$$a_{19} \quad -\frac{1}{2e^{i\ ab}\ -a^2\ b^2}\frac{Q^2}{2}b$$

Para a_{20}

$$f z \quad -\frac{1}{2}\frac{Q^2}{2\left(z-be^{i\ ab}\right)z}$$

$$Res \quad \lim_{z \ 0}\left(z - 0\ \left(-\frac{1}{2}\frac{Q^2}{2\left(z-be^{i\ ab}\right)z}\right)\right) \quad \frac{1}{2be^{i\ ab}}\frac{Q^2}{2}$$

$$a_{20} \quad \frac{1}{2be^{i\ ab}}\frac{Q^2}{2}$$

Para a_{21}

$$f z \quad \frac{1}{2}i\frac{Q}{2\left(z-be^{i\ ab}\right)}\frac{1}{z-R_1e^{i\ p}}$$

$$a_{21} \quad 0$$

Para a_{22}

$$f\,z \qquad \frac{Q}{\left(z-be^{i\ ab}\right)}V_o$$

$$a_{22} \qquad 0$$

Para a_{23}

$$f\,z \qquad -\frac{Q}{\left(z-be^{i\ ab}\right)}V_o\frac{a^2}{z^2}$$

$$Res \qquad \frac{1}{2-1\ !}\lim_{z\ 0}\frac{d^{2-1}}{dz^{2-1}}\left(\ z-0\ ^2\left(-\frac{Q}{\left(z-be^{i\ ab}\right)}V_o\frac{a^2}{z^2}\right)\right) \qquad \frac{1}{b^2e^{2\ i\ ab}}QV_o\frac{a^2}{}$$

$$a_{23} \qquad \frac{1}{b^2e^{2\ i\ ab}}QV_o\frac{a^2}{}$$

Para a_{24}

$$f\,z \qquad \frac{1}{2}i\frac{Q}{^2\left(z-be^{i\ ab}\right)}\frac{}{z}$$

$$Res \qquad \lim_{z\ 0}\left(\ z-0\ \left(\frac{1}{2}i\frac{Q}{^2\left(z-be^{i\ ab}\right)}\frac{}{z}\right)\right) \qquad -\frac{1}{2}\frac{i}{be^{i\ ab}}\frac{Q}{2}$$

$$a_{24} \qquad -\frac{1}{2}\frac{i}{be^{i\ ab}}\frac{Q}{2}$$

Para a_{25}

$$f\,z \qquad \frac{1}{2}iQ\frac{b}{^2\left(zb-a^2e^{i\ ab}\right)}\ 1\frac{R_1}{zR_1-a^2e^{i\ n}}$$

$$Res_1 \qquad \lim_{z\ \frac{a^2e^{i\ ab}}{b}}\left(\left(z-\frac{a^2e^{i\ ab}}{b}\right)\left(\frac{1}{2}iQ\frac{b}{^2\left(zb-a^2e^{i\ ab}\right)}\ 1\frac{R_1}{zR_1-a^2e^{i\ n}}\right)\right)$$

$$-\frac{1}{2}\frac{i}{a^2\left(-e^{i\ ab}R_1\ e^{i\ n}b\right)}Q\frac{b}{2}\ _1R_1$$

$$Res_2 \qquad \lim_{z\ \frac{a^2e^{i\ n}}{R_1}}\left(\left(z-\frac{a^2e^{i\ n}}{R_1}\right)\left(\frac{1}{2}iQ\frac{b}{^2\left(zb-a^2e^{i\ ab}\right)}\ 1\frac{R_1}{zR_1-a^2e^{i\ n}}\right)\right)$$

$$\frac{1}{2}\frac{i}{a^2\left(-e^{i\ ab}R_1\ e^{i\ n}b\right)}Q\frac{b}{2}\ _1R_1$$

$$a_{25} \quad Res_1 \quad Res_2 \quad 0$$

Para a_{26}

$$f\ z \quad -\frac{1}{2}iQ\frac{b}{^2\left(zb-a^2e^{i\ ab}\right)} \quad 1\frac{R_1}{zR_1-a^2e^{i\ p}}$$

$$Res_1 \quad \lim_{z \ \frac{a^2e^{i\ ab}}{b}}\left(\left(z-\frac{a^2e^{i\ ab}}{b}\right)\left(-\frac{1}{2}iQ\frac{b}{^2\left(zb-a^2e^{i\ ab}\right)} \quad 1\frac{R_1}{zR_1-a^2e^{i\ p}}\right)\right)$$

$$-\frac{1}{2}\frac{i}{a^2\left(e^{i\ ab}R_1-e^{i\ p}b\right)}Q\frac{b}{2} \quad 1R_1$$

$$Res_2 \quad \lim_{z \ \frac{a^2e^{i\ p}}{R_1}}\left(\left(z-\frac{a^2e^{i\ p}}{R_1}\right)\left(-\frac{1}{2}iQ\frac{b}{^2\left(zb-a^2e^{i\ ab}\right)} \quad 1\frac{R_1}{zR_1-a^2e^{i\ p}}\right)\right)$$

$$\frac{1}{2}\frac{i}{a^2\left(e^{i\ ab}R_1-e^{i\ p}b\right)}Q\frac{b}{2} \quad 1R_1$$

$$a_{26} \quad Res_1 \quad Res_2 \quad 0$$

Para a_{27}

$$f\ z \quad \frac{1}{2}iQ\frac{b}{^2\left(zb-a^2e^{i\ ab}\right)} \quad \frac{2}{z\ R_2e^{i\ n}}$$

$$Res \quad \lim_{z \ \frac{a^2e^{i\ ab}}{b}}\left(\left(z-\frac{a^2e^{i\ ab}}{b}\right)\left(\frac{1}{2}iQ\frac{b}{^2\left(zb-a^2e^{i\ ab}\right)} \quad \frac{2}{z\ R_2e^{i\ n}}\right)\right) \quad \frac{1}{2}\frac{i}{a^2e^{i\ ab}\ R_2e^{i\ n}b}Q\frac{b}{2} \quad 2$$

$$a_{27} \quad \frac{1}{2}\frac{i}{a^2e^{i\ ab}\ R_2e^{i\ n}b}Q\frac{b}{2} \quad 2$$

Para a_{28}

$$f\ z \quad -\frac{1}{2}Q^2\frac{b}{^2\left(zb-a^2e^{i\ ab}\right)z}$$

$$Res_1 \quad \lim_{z \ \frac{a^2e^{i\ ab}}{b}}\left(\left(z-\frac{a^2e^{i\ ab}}{b}\right)\left(-\frac{1}{2}Q^2\frac{b}{^2\left(zb-a^2e^{i\ ab}\right)z}\right)\right) \quad -\frac{1}{2a^2e^{i\ ab}}Q^2\frac{b}{2}$$

$$Res_2 \quad \lim_{z \ 0}\left(z-0\left(-\frac{1}{2}Q^2\frac{b}{^2\left(zb-a^2e^{i\ ab}\right)z}\right)\right) \quad \frac{1}{2a^2e^{i\ ab}}Q^2\frac{b}{2}$$

$$a_{28} \quad Res_1 \quad Res_2 \quad 0$$

Para a_{29}

$$f\ z \quad \frac{1}{2}iQ\frac{b}{2\left(zb-a^2e^{i\ ab}\right)}\ \frac{1}{z-R_1e^{i\ p}}$$

$$Res \quad \lim_{z\ \frac{a^2e^{i\ ab}}{b}}\left(\left(z-\frac{a^2e^{i\ ab}}{b}\right)\left(\frac{1}{2}iQ\frac{b}{2\left(zb-a^2e^{i\ ab}\right)}\ \frac{1}{z-R_1e^{i\ p}}\right)\right) \quad -\frac{1}{2}\frac{i}{-a^2e^{i\ ab}\ R_1e^{i\ p}b}Q\frac{b}{2}\quad 1$$

$$a_{29}\quad -\frac{1}{2}\frac{i}{-a^2e^{i\ ab}\ R_1e^{i\ p}b}Q\frac{b}{2}\quad 1$$

Para a_{30}

$$f\ z \quad -Q\frac{b}{\left(zb-a^2e^{i\ ab}\right)}V_o\frac{a^2}{z^2}$$

$$Res_1 \quad \lim_{z\ \frac{a^2e^{i\ ab}}{b}}\left(\left(z-\frac{a^2e^{i\ ab}}{b}\right)\left(-Q\frac{b}{\left(zb-a^2e^{i\ ab}\right)}V_o\frac{a^2}{z^2}\right)\right) \quad -\frac{b^2}{a^2e^{2\ i\ ab}}\frac{Q}{}V_o$$

$$Res_2 \quad \frac{1}{2-1\ !}\lim_{z\ 0}\frac{d^{2-1}}{dz^{2-1}}\left(\ z-0\ ^2\left(-Q\frac{b}{\left(zb-a^2e^{i\ ab}\right)}V_o\frac{a^2}{z^2}\right)\right) \quad \frac{b^2}{a^2e^{2\ i\ ab}}\frac{Q}{}V_o$$

$$a_{30}\quad Res_1\quad Res_2\quad 0$$

Para a_{31}

$$f\ z \quad -\frac{1}{2}iQ\frac{b}{2\left(zb-a^2e^{i\ ab}\right)}\ \frac{1}{z-R_1e^{i\ n}}$$

$$Res \quad \lim_{z\ \frac{a^2e^{i\ ab}}{b}}\left(\left(z-\frac{a^2e^{i\ ab}}{b}\right)\left(-\frac{1}{2}iQ\frac{b}{2\left(zb-a^2e^{i\ ab}\right)}\ \frac{1}{z-R_1e^{i\ n}}\right)\right) \quad \frac{1}{2}\frac{i}{-a^2e^{i\ ab}\ R_1e^{i\ n}b}Q\frac{b}{2}\quad 1$$

$$a_{31}\quad \frac{1}{2}\frac{i}{-a^2e^{i\ ab}\ R_1e^{i\ n}b}Q\frac{b}{2}\quad 1$$

Para a_{32}

$$f\ z \quad \frac{1}{2}iQ\frac{b}{2\left(zb-a^2e^{i\ ab}\right)}\ \ 2\frac{R_2}{zR_2\ a^2e^{i\ p}}$$

$$Res_1 \quad \lim_{z \to \frac{a^2 e^{i\ ab}}{b}} \left(\left(z - \frac{a^2 e^{i\ ab}}{b} \right) \left(\frac{1}{2} iQ \frac{b}{^2(zb-a^2 e^{i\ ab})} \quad 2\frac{R_2}{zR_2 \quad a^2 e^{i\ p}} \right) \right)$$

$$\frac{1}{2} \frac{i}{a^2 (R_2 e^{i\ ab} \quad e^{i\ p}b)} Q \frac{b}{2} \quad {}_2 R_2$$

$$Res_2 \quad \lim_{z \to -\frac{a^2 e^{i\ p}}{R_2}} \left(\left(z \quad \frac{a^2 e^{i\ p}}{R_2} \right) \left(\frac{1}{2} iQ \frac{b}{^2(zb-a^2 e^{i\ ab})} \quad 2\frac{R_2}{zR_2 \quad a^2 e^{i\ p}} \right) \right)$$

$$- \frac{1}{2} \frac{i}{a^2 (R_2 e^{i\ ab} \quad e^{i\ p}b)} Q \frac{b}{2} \quad {}_2 R_2$$

$$a_{32} \quad Res_1 \quad Res_2 \quad 0$$

Para a_{33}

$$f z \quad -\frac{1}{2} iQ \frac{b}{^2(zb-a^2 e^{i\ ab})} \quad \frac{2}{z \quad R_2 e^{i\ p}}$$

$$Res \quad \lim_{z \to \frac{a^2 e^{i\ ab}}{b}} \left(\left(z - \frac{a^2 e^{i\ ab}}{b} \right) \left(-\frac{1}{2} iQ \frac{b}{^2(zb-a^2 e^{i\ ab})} \quad \frac{2}{z \quad R_2 e^{i\ p}} \right) \right) \quad - \frac{1}{2} \frac{i}{a^2 e^{i\ ab} \quad R_2 e^{i\ p}b} Q \frac{b}{2} \quad 2$$

$$a_{33} \quad - \frac{1}{2} \frac{i}{a^2 e^{i\ ab} \quad R_2 e^{i\ p}b} Q \frac{b}{2} \quad 2$$

Para a_{34}

$$f z \quad -\frac{1}{2} iQ \frac{b}{^2(zb-a^2 e^{i\ ab})} R_2 \frac{2}{zR_2 \quad a^2 e^{i\ n}}$$

$$Res_1 \quad \lim_{z \to \frac{a^2 e^{i\ ab}}{b}} \left(\left(z - \frac{a^2 e^{i\ ab}}{b} \right) \left(-\frac{1}{2} iQ \frac{b}{^2(zb-a^2 e^{i\ ab})} R_2 \frac{2}{zR_2 \quad a^2 e^{i\ n}} \right) \right)$$

$$- \frac{1}{2} \frac{i}{a^2 (R_2 e^{i\ ab} \quad e^{i\ n}b)} Q \frac{b}{2} R_2 \quad 2$$

$$Res_2 \quad \lim_{z \to -\frac{a^2 e^{i\ n}}{R_2}} \left(\left(z \quad \frac{a^2 e^{i\ n}}{R_2} \right) \left(-\frac{1}{2} iQ \frac{b}{^2(zb-a^2 e^{i\ ab})} R_2 \frac{2}{zR_2 \quad a^2 e^{i\ n}} \right) \right)$$

$$\frac{1}{2} \frac{i}{a^2 (R_2 e^{i\ ab} \quad e^{i\ n}b)} Q \frac{b}{2} R_2 \quad 2$$

$$a_{34} \quad Res_1 \quad Res_2 \quad 0$$

Para a_{35}

$$f z \quad \frac{1}{4} \frac{Q^2}{^2 z^2}$$

$$Res = \frac{1}{2-1\,!}\lim_{z\to 0}\frac{d^{2-1}}{dz^{2-1}}\left((z-0)^2\left(\frac{1}{4}\frac{Q^2}{2z^2}\right)\right)=0$$

$$a_{35}=0$$

Para a_{36}

$$f(z)=-\frac{1}{2}\frac{\frac{2}{i}}{{}^2(z-R_1 e^{i\,p})}\frac{R_1}{zR_1-a^2 e^{i\,n}}$$

$$Res=\lim_{z\to\frac{a^2 e^{i\,n}}{R_1}}\left(\left(z-\frac{a^2 e^{i\,n}}{R_1}\right)\left(-\frac{1}{2}\frac{\frac{2}{i}}{{}^2(z-R_1 e^{i\,p})}\frac{R_1}{zR_1-a^2 e^{i\,n}}\right)\right)=\frac{1}{2(-a^2 e^{i\,n}\;e^{i\,p}R_1^2)}\frac{\frac{2}{i}}{2}R_1$$

$$a_{36}=\frac{1}{2(-a^2 e^{i\,n}\;e^{i\,p}R_1^2)}\frac{\frac{2}{i}}{2}R_1$$

Para a_{37}

$$f(z)=\frac{1}{2}\frac{\frac{2}{i}}{{}^2(z-R_1 e^{i\,p})(z-R_1 e^{i\,n})}$$

$$a_{37}=0$$

Para a_{38}

$$f(z)=-\frac{1}{2}i\frac{1}{{}^2(z-R_1 e^{i\,p})}\frac{Q}{z}$$

$$Res=\lim_{z\to 0}\left(z-0\left(-\frac{1}{2}i\frac{1}{{}^2(z-R_1 e^{i\,p})}\frac{Q}{z}\right)\right)=\frac{1}{2}\frac{i}{R_1 e^{i\,p}}\frac{1}{2}Q$$

$$a_{38}=\frac{1}{2}\frac{i}{R_1 e^{i\,p}}\frac{1}{2}Q$$

Para a_{39}

$$f(z)=i\frac{1}{(z-R_1 e^{i\,p})}V_o$$

$$a_{39}=0$$

Para a_{40}

$$f\ z \qquad -i\frac{1}{(z-R_1 e^{i\ p})}\,V_o\,\frac{a^2}{z^2}$$

$$Res \qquad \frac{1}{2-1\ !}\ \lim_{z\ 0}\frac{d^{2-1}}{dz^{2-1}}\left(\ z-0\ ^2\left(-i\frac{1}{(z-R_1 e^{i\ p})}\,V_o\,\frac{a^2}{z^2}\right)\right) \qquad \frac{i}{R_1^2 e^{2\ i\ p}}\ {}_1 V_o a^2$$

$$a_{40} \qquad \frac{i}{R_1^2 e^{2\ i\ p}}\ {}_1 V_o a^2$$

Para a_{41}

$$f\ z \qquad -\frac{1}{2}\ \frac{1}{^2(z-R_1 e^{i\ p})}\ \frac{1}{z}$$

$$Res \qquad \lim_{z\ 0}\left(\ z-0\ \left(-\frac{1}{2}\ \frac{1}{^2(z-R_1 e^{i\ p})}\ \frac{1}{z}\right)\right) \qquad \frac{1}{2R_1 e^{i\ p}}\ -\frac{1}{2}$$

$$a_{41} \qquad \frac{1}{2R_1 e^{i\ p}}\ -\frac{1}{2}$$

Para a_{42}

$$f\ z \qquad -\frac{1}{4}\ \frac{\frac{2}{1}}{^2(z-R_1 e^{i\ p})^2}$$

$$a_{42} \qquad 0$$

Para a_{43}

$$f\ z \qquad -\frac{1}{2}\ \frac{1}{^2(z-R_1 e^{i\ p})}\ \frac{1}{z}\ \frac{2}{R_2 e^{i\ n}}$$

$$a_{43} \qquad 0$$

Para a_{44}

$$f\ z \qquad \frac{1}{2}\ \frac{\frac{2}{1}}{^2(z-R_1 e^{i\ p})}\ \frac{R_1}{zR_1-a^2 e^{i\ p}}$$

$$Res \quad \lim_{z \to \frac{a^2 e^{i p}}{R_1}} \left(\left(z - \frac{a^2 e^{i p}}{R_1} \right) \left(\frac{1}{2} \frac{\frac{2}{1}}{^2(z-R_1 e^{i p})} \frac{R_1}{zR_1 - a^2 e^{i p}} \right) \right) \quad - \frac{1}{2e^{i p}(-a^2 R_1^2)} \frac{\frac{2}{1}}{2} R_1$$

$$a_{44} \quad - \frac{1}{2e^{i p}(-a^2 R_1^2)} \frac{\frac{2}{1}}{2} R_1$$

Para a_{45}

$$f z \quad -\frac{1}{4} \frac{\frac{2}{1}}{^2(z-R_1 e^{i n})^2}$$

$$a_{45} \quad 0$$

Para a_{46}

$$f z \quad -\frac{1}{2}i \quad 1 \frac{R_1}{^2(zR_1 - a^2 e^{i n})} \frac{Q}{z}$$

$$Res_1 \quad \lim_{z \to \frac{a^2 e^{i n}}{R_1}} \left(\left(z - \frac{a^2 e^{i n}}{R_1} \right) \left(-\frac{1}{2}i \quad 1 \frac{R_1}{^2(zR_1 - a^2 e^{i n})} \frac{Q}{z} \right) \right) \quad -\frac{1}{2} \frac{i}{a^2 e^{i n}} \quad 1 \frac{R_1}{2} Q$$

$$Res_2 \quad \lim_{z \to 0} \left(z - 0 \left(-\frac{1}{2}i \quad 1 \frac{R_1}{^2(zR_1 - a^2 e^{i n})} \frac{Q}{z} \right) \right) \quad \frac{1}{2} \frac{i}{a^2 e^{i n}} \quad 1 \frac{R_1}{2} Q$$

$$a_{46} \quad Res_1 \quad Res_2 \quad 0$$

Para a_{47}

$$f z \quad -\frac{1}{2} \quad 1 \frac{R_1}{^2(zR_1 - a^2 e^{i n})} \frac{1}{z}$$

$$Res_1 \quad \lim_{z \to \frac{a^2 e^{i n}}{R_1}} \left(\left(z - \frac{a^2 e^{i n}}{R_1} \right) \left(-\frac{1}{2} \quad 1 \frac{R_1}{^2(zR_1 - a^2 e^{i n})} \frac{1}{z} \right) \right) \quad -\frac{1}{2a^2 e^{i n}} \quad 1 \frac{R_1}{2}$$

$$Res_2 \quad \lim_{z \to 0} \left(z - 0 \left(-\frac{1}{2} \quad 1 \frac{R_1}{^2(zR_1 - a^2 e^{i n})} \frac{1}{z} \right) \right) \quad \frac{1}{2a^2 e^{i n}} \quad 1 \frac{R_1}{2}$$

$$a_{47} \quad Res_1 \quad Res_2 \quad 0$$

Para a_{48}

$$f\ z \quad i \quad 1\,\frac{R_1}{(zR_1-a^2 e^{i\ n})}V_o$$

$$Res \quad \lim_{z\ \frac{a^2 e^{i\ n}}{R_1}} \left(\left(z - \frac{a^2 e^{i\ n}}{R_1}\right)\left(i \quad 1\,\frac{R_1}{(zR_1-a^2 e^{i\ n})}V_o\right)\right) \quad i\!-\!^1 V_o$$

$$a_{48} \quad i\!-\!^1 V_o$$

Para a_{49}

$$f\ z \quad -i \quad 1\,\frac{R_1}{(zR_1-a^2 e^{i\ n})}V_o\,\frac{a^2}{z^2}$$

$$Res_1 \quad \lim_{z\ \frac{a^2 e^{i\ n}}{R_1}}\left(\left(z - \frac{a^2 e^{i\ n}}{R_1}\right)\left(-i \quad 1\,\frac{R_1}{(zR_1-a^2 e^{i\ n})}V_o\,\frac{a^2}{z^2}\right)\right) \quad -i\,\frac{R_1^2}{a^2 e^{2\ i\ n}}\!-\!^1 V_o$$

$$Res_2 \quad \frac{1}{2-1\ !}\lim_{z\ 0}\frac{d^{2-1}}{dz^{2-1}}\left(\ z-0\ ^2\left(-i \quad 1\,\frac{R_1}{(zR_1-a^2 e^{i\ n})}V_o\,\frac{a^2}{z^2}\right)\right) \quad i\,\frac{R_1^2}{a^2 e^{2\ i\ n}}\!-\!^1 V_o$$

$$a_{49} \quad Res_1 \quad Res_2 \quad 0$$

Para a_{50}

$$f\ z \quad \frac{1}{2}\,\frac{1}{^2(z-R_1 e^{i\ p})}R_2\,\frac{2}{zR_2\ a^2 e^{i\ n}}$$

$$Res \quad \lim_{z\ -\frac{a^2 e^{i\ n}}{R_2}}\left(\left(z\quad \frac{a^2 e^{i\ n}}{R_2}\right)\left(\frac{1}{2}\,\frac{1}{^2(z-R_1 e^{i\ p})}R_2\,\frac{2}{zR_2\ a^2 e^{i\ n}}\right)\right) \quad -\frac{1}{2(a^2 e^{i\ n}\ R_1 e^{i\ p}R_2)}\!-\!^{\frac{1}{2}}\ _2R_2$$

$$a_{50} \quad -\frac{1}{2(a^2 e^{i\ n}\ R_1 e^{i\ p}R_2)}\!-\!^{\frac{1}{2}}\ _2R_2$$

Para a_{51}

$$f\ z \quad \frac{1}{2}\,\frac{1}{^2(z-R_1 e^{i\ p})}\,\frac{2}{z\ R_2 e^{i\ p}}$$

$$a_{51} \quad 0$$

Para a_{52}

$$f\ z \quad -\frac{1}{2}\ \frac{1}{^2(z-R_1e^{i\ p})}\ ^2\frac{R_2}{zR_2\ a^2e^{i\ p}}$$

$$Res \quad \lim_{z\ -\frac{a^2e^{i\ p}}{R_2}}\left(\left(z\quad \frac{a^2e^{i\ p}}{R_2}\right)\left(-\frac{1}{2}\ \frac{1}{^2(z-R_1e^{i\ p})}\ ^2\frac{R_2}{zR_2\ a^2e^{i\ p}}\right)\right) \quad \frac{1}{2(a^2e^{i\ p}\ R_1e^{i\ p}R_2)}\ ^{-\frac{1}{2}}\ ^2R_2$$

$$a_{52} \quad \frac{1}{2(a^2e^{i\ p}\ R_1e^{i\ p}R_2)}\ ^{-\frac{1}{2}}\ ^2R_2$$

Para a_{53}

$$f\ z \quad -\frac{1}{4}\ \frac{^2}{^2z^2}$$

$$Res \quad \frac{1}{2-1\ !}\lim_{z\ 0}\frac{d^{2-1}}{dz^{2-1}}\left(\ z-0\ ^2\left(-\frac{1}{4}\ \frac{^2}{^2z^2}\right)\right) \quad 0$$

$$a_{53} \quad 0$$

Para a_{54}

$$f\ z \quad \frac{1}{2}\ ^2\frac{R_1}{^2(zR_1-a^2e^{i\ n})(z-R_1e^{i\ n})}$$

$$Res \quad \lim_{z\ \frac{a^2e^{i\ n}}{R_1}}\left(\left(z-\frac{a^2e^{i\ n}}{R_1}\right)\left(\frac{1}{2}\ ^2\frac{R_1}{^2(zR_1-a^2e^{i\ n})(z-R_1e^{i\ n})}\right)\right) \quad -\frac{1}{2e^{i\ n}(-a^2\ R_1^2)}\ ^2\frac{R_1}{2}$$

$$a_{54} \quad -\frac{1}{2e^{i\ n}(-a^2\ R_1^2)}\ ^2\frac{R_1}{2}$$

Para a_{55}

$$f\ z \quad -\frac{1}{4}\ ^2\frac{R_1^2}{^2(zR_1-a^2e^{i\ n})^2}$$

$$Res \quad \frac{1}{2-1\ !}\lim_{z\ \frac{a^2e^{i\ n}}{R_1}}\frac{d^{2-1}}{dz^{2-1}}\left(\left(z-\frac{a^2e^{i\ n}}{R_1}\right)^2\left(-\frac{1}{4}\ ^2\frac{R_1^2}{^2(zR_1-a^2e^{i\ n})^2}\right)\right) \quad 0$$

$$a_{55} \quad 0$$

Para a_{56}

$$f\ z = \frac{1}{2}\ ^2\ \frac{R_1^2}{^2\left(zR_1-a^2e^{i\ n}\right)\left(zR_1-a^2e^{i\ p}\right)}$$

$$Res_1 = \lim_{z \to \frac{a^2e^{i\ n}}{R_1}}\left(\left(z-\frac{a^2e^{i\ n}}{R_1}\right)\left(\frac{1}{2}\ ^2\ \frac{R_1^2}{^2\left(zR_1-a^2e^{i\ n}\right)\left(zR_1-a^2e^{i\ p}\right)}\right)\right) = \frac{1}{2}\ \frac{R_1}{a^2\left(e^{i\ n}-e^{i\ p}\right)}\ \frac{2}{1}\ \frac{1}{2}$$

$$Res_2 = \lim_{z \to \frac{a^2e^{i\ p}}{R_1}}\left(\left(z-\frac{a^2e^{i\ p}}{R_1}\right)\left(\frac{1}{2}\ ^2\ \frac{R_1^2}{^2\left(zR_1-a^2e^{i\ n}\right)\left(zR_1-a^2e^{i\ p}\right)}\right)\right) = -\frac{1}{2}\ \frac{R_1}{a^2\left(e^{i\ n}-e^{i\ p}\right)}\ \frac{2}{1}\ \frac{1}{2}$$

$$a_{56} = Res_1 \quad Res_2 = 0$$

Para a_{57}

$$f\ z = -\frac{1}{2}\ ^1\ \frac{R_1}{^2\left(zR_1-a^2e^{i\ n}\right)}\ \frac{2}{z\ R_2 e^{i\ n}}$$

$$Res = \lim_{z \to \frac{a^2e^{i\ n}}{R_1}}\left(\left(z-\frac{a^2e^{i\ n}}{R_1}\right)\left(-\frac{1}{2}\ ^1\ \frac{R_1}{^2\left(zR_1-a^2e^{i\ n}\right)}\ \frac{2}{z\ R_2 e^{i\ n}}\right)\right) = -\frac{1}{2\left(a^2e^{i\ n}\ R_2 e^{i\ n}R_1\right)}\ ^1\ \frac{R_1}{2}\ ^2$$

$$a_{57} = -\frac{1}{2\left(a^2e^{i\ n}\ R_2 e^{i\ n}R_1\right)}\ ^1\ \frac{R_1}{2}\ ^2$$

Para a_{58}

$$f\ z = \frac{1}{2}\ ^1\ \frac{R_1}{^2\left(zR_1-a^2e^{i\ n}\right)}R_2\ \frac{2}{zR_2\ a^2e^{i\ n}}$$

$$Res_1 = \lim_{z \to \frac{a^2e^{i\ n}}{R_1}}\left(\left(z-\frac{a^2e^{i\ n}}{R_1}\right)\left(\frac{1}{2}\ ^1\ \frac{R_1}{^2\left(zR_1-a^2e^{i\ n}\right)}R_2\ \frac{2}{zR_2\ a^2e^{i\ n}}\right)\right)$$

$$= \frac{1}{2a^2\left(e^{i\ n}R_1\ e^{i\ n}R_2\right)}\ ^1\ \frac{R_1}{2}\ ^2R_2$$

$$Res_2 = \lim_{z \to -\frac{a^2e^{i\ n}}{R_2}}\left(\left(z\ \frac{a^2e^{i\ n}}{R_2}\right)\left(\frac{1}{2}\ ^1\ \frac{R_1}{^2\left(zR_1-a^2e^{i\ n}\right)}R_2\ \frac{2}{zR_2\ a^2e^{i\ n}}\right)\right)$$

$$= -\frac{1}{2a^2\left(e^{i\ n}R_1\ e^{i\ n}R_2\right)}\ ^1\ \frac{R_1}{2}\ ^2R_2$$

$$a_{58} = Res_1 \quad Res_2 = 0$$

Para a_{59}

$$f(z) = \frac{1}{2}\left(1-\frac{R_1}{2(zR_1-a^2e^{in})}\right)\frac{2}{z-R_2e^{ip}}$$

$$Res = \lim_{z\to\frac{a^2e^{in}}{R_1}}\left(\left(z-\frac{a^2e^{in}}{R_1}\right)\left(\frac{1}{2}\left(1-\frac{R_1}{2(zR_1-a^2e^{in})}\right)\frac{2}{z-R_2e^{ip}}\right)\right) = \frac{1}{2(a^2e^{in}-R_2e^{ip}R_1)}\left(1-\frac{R_1}{2}\right)2$$

$$a_{59} = \frac{1}{2(a^2e^{in}-R_2e^{ip}R_1)}\left(1-\frac{R_1}{2}\right)2$$

Para a_{60}

$$f(z) = -i\frac{1}{(z-R_1e^{in})}V_o$$

$$a_{60} = 0$$

Para a_{61}

$$f(z) = -\frac{1}{2}\left(1-\frac{R_1}{2(zR_1-a^2e^{in})}\right)2\frac{R_2}{zR_2-a^2e^{ip}}$$

$$Res_1 = \lim_{z\to\frac{a^2e^{in}}{R_1}}\left(\left(z-\frac{a^2e^{in}}{R_1}\right)\left(-\frac{1}{2}\left(1-\frac{R_1}{2(zR_1-a^2e^{in})}\right)2\frac{R_2}{zR_2-a^2e^{ip}}\right)\right)$$

$$= -\frac{1}{2a^2(e^{in}R_2-e^{ip}R_1)}\left(1-\frac{R_1}{2}\right)2R_2$$

$$Res_2 = \lim_{z\to-\frac{a^2e^{ip}}{R_2}}\left(\left(z-\frac{a^2e^{ip}}{R_2}\right)\left(-\frac{1}{2}\left(1-\frac{R_1}{2(zR_1-a^2e^{in})}\right)2\frac{R_2}{zR_2-a^2e^{ip}}\right)\right)$$

$$= \frac{1}{2a^2(e^{in}R_2-e^{ip}R_1)}\left(1-\frac{R_1}{2}\right)2R_2$$

$$a_{61} = Res_1 + Res_2 = 0$$

Para a_{62}

$$f(z) = -\frac{1}{2}\frac{\frac{2}{1}}{2(z-R_1e^{in})}\frac{R_1}{zR_1-a^2e^{ip}}$$

$$Res = \lim_{z\to\frac{a^2e^{ip}}{R_1}}\left(\left(z-\frac{a^2e^{ip}}{R_1}\right)\left(-\frac{1}{2}\frac{\frac{2}{1}}{2(z-R_1e^{in})}\frac{R_1}{zR_1-a^2e^{ip}}\right)\right) = -\frac{1}{2(a^2e^{ip}-R_1^2e^{in})}\frac{\frac{2}{1}}{2}R_1$$

$$a_{62} = -\frac{1}{2(a^2e^{ip}-R_1^2e^{in})}\frac{\frac{2}{1}}{2}R_1$$

Para a_{63}

$$f\ z \qquad \frac{1}{2}\frac{1}{2\left(z-R_1e^{i\ n}\right)^2}\frac{2}{z\ R_2e^{i\ n}}$$

$\qquad a_{63} \qquad 0$

Para a_{64}

$$f\ z \qquad \frac{1}{2}i\frac{1}{2\left(z-R_1e^{i\ n}\right)^2}\frac{Q}{z}$$

$$Res \qquad \lim_{z\ 0}\left(\ z-0\ \left(\frac{1}{2}i\frac{1}{2\left(z-R_1e^{i\ n}\right)^2}\frac{Q}{z}\right)\right) \qquad -\frac{1}{2}\frac{i}{R_1e^{i\ n}}\frac{1}{2}Q$$

$\qquad a_{64} \qquad -\frac{1}{2}\frac{i}{R_1e^{i\ n}}\frac{1}{2}Q$

Para a_{65}

$$f\ z \qquad i\frac{1}{\left(z-R_1e^{i\ n}\right)}V_o\frac{a^2}{z^2}$$

$$Res \qquad \frac{1}{2-1\ !}\lim_{z\ 0}\frac{d^{2-1}}{dz^{2-1}}\left(\ z-0\ ^2\left(i\frac{1}{\left(z-R_1e^{i\ n}\right)}V_o\frac{a^2}{z^2}\right)\right) \qquad -\frac{i}{R_1^2e^{2\ i\ n}}\ _1V_oa^2$$

$\qquad a_{65} \qquad -\frac{i}{R_1^2e^{2\ i\ n}}\ _1V_oa^2$

Para a_{66}

$$f\ z \qquad \frac{1}{2}\frac{1}{2\left(z-R_1e^{i\ n}\right)^2}\frac{1}{z}$$

$$Res \qquad \lim_{z\ 0}\left(\ z-0\ \left(\frac{1}{2}\frac{1}{2\left(z-R_1e^{i\ n}\right)^2}\frac{1}{z}\right)\right) \qquad -\frac{1}{2R_1e^{i\ n}}\frac{1}{2}$$

$\qquad a_{66} \qquad -\frac{1}{2R_1e^{i\ n}}\frac{1}{2}$

Para a_{67}

$$f(z) = \frac{1}{2}i\left(1-\frac{R_1}{2(zR_1-a^2e^{i p})}\right)\frac{Q}{z}$$

$$Res_1 = \lim_{z \to \frac{a^2e^{i p}}{R_1}}\left(\left(z-\frac{a^2e^{i p}}{R_1}\right)\left(\frac{1}{2}i\left(1-\frac{R_1}{2(zR_1-a^2e^{i p})}\right)\frac{Q}{z}\right)\right) = \frac{1}{2}\frac{i}{a^2e^{i p}}\left(1-\frac{R_1}{2}\right)Q$$

$$Res_2 = \lim_{z \to 0}\left(z-0\left(\frac{1}{2}i\left(1-\frac{R_1}{2(zR_1-a^2e^{i p})}\right)\frac{Q}{z}\right)\right) = -\frac{1}{2}\frac{i}{a^2e^{i p}}\left(1-\frac{R_1}{2}\right)Q$$

$$a_{67} = Res_1 + Res_2 = 0$$

Para a_{68}

$$f(z) = \frac{1}{2}\left(1-\frac{R_1}{2(zR_1-a^2e^{i p})}\right)\frac{1}{z}$$

$$Res_1 = \lim_{z \to \frac{a^2e^{i p}}{R_1}}\left(\left(z-\frac{a^2e^{i p}}{R_1}\right)\left(\frac{1}{2}\left(1-\frac{R_1}{2(zR_1-a^2e^{i p})}\right)\frac{1}{z}\right)\right) = \frac{1}{2a^2e^{i p}}\left(1-\frac{R_1}{2}\right)$$

$$Res_2 = \lim_{z \to 0}\left(z-0\left(\frac{1}{2}\left(1-\frac{R_1}{2(zR_1-a^2e^{i p})}\right)\frac{1}{z}\right)\right) = -\frac{1}{2a^2e^{i p}}\left(1-\frac{R_1}{2}\right)$$

$$a_{68} = Res_1 + Res_2 = 0$$

Para a_{69}

$$f(z) = i\left(1-\frac{R_1}{(zR_1-a^2e^{i p})}\right)V_o\frac{a^2}{z^2}$$

$$Res_1 = \lim_{z \to \frac{a^2e^{i p}}{R_1}}\left(\left(z-\frac{a^2e^{i p}}{R_1}\right)\left(i\left(1-\frac{R_1}{(zR_1-a^2e^{i p})}\right)V_o\frac{a^2}{z^2}\right)\right) = \frac{i}{a^2e^{2 i p}}\left(1-R_1^2\right)V_o$$

$$Res_2 = \frac{1}{2-1!}\lim_{z \to 0}\frac{d^{2-1}}{dz^{2-1}}\left(z-0\right)^2\left(i\left(1-\frac{R_1}{(zR_1-a^2e^{i p})}\right)V_o\frac{a^2}{z^2}\right) = -\frac{i}{a^2e^{2 i p}}\left(1-R_1^2\right)V_o$$

$$a_{69} = Res_1 + Res_2 = 0$$

Para a_{70}

$$f(z) = -\frac{1}{2}\frac{1}{2(z-R_1e^{i n})}R_2\frac{2}{zR_2(a^2e^{i n})}$$

$$Res \quad \lim_{z \to -\frac{a^2 e^{i n}}{R_2}} \left(\left(z + \frac{a^2 e^{i n}}{R_2}\right) \left(-\frac{1}{2} \frac{1}{2(z-R_1 e^{i n})} R_2 \frac{2}{zR_2 + a^2 e^{i n}}\right) \right) = \frac{1}{2(a^2 e^{i n} + R_1 e^{i n} R_2)} -\frac{1}{2} \cdot 2R_2$$

$$a_{70} = \frac{1}{2(a^2 e^{i n} + R_1 e^{i n} R_2)} -\frac{1}{2} \cdot 2R_2$$

Para a_{71}

$$f z = -i \cdot 1 \frac{R_1}{(zR_1 - a^2 e^{i p})} V_o$$

$$Res \quad \lim_{z \to \frac{a^2 e^{i p}}{R_1}} \left(\left(z - \frac{a^2 e^{i p}}{R_1}\right) \left(-i \cdot 1 \frac{R_1}{(zR_1 - a^2 e^{i p})} V_o\right) \right) = -i \frac{1}{} V_o$$

$$a_{71} = -i \frac{1}{} V_o$$

Para a_{72}

$$f z = \frac{1}{2} \frac{1}{2(z-R_1 e^{i n})} \cdot 2 \frac{R_2}{zR_2 + a^2 e^{i p}}$$

$$Res \quad \lim_{z \to -\frac{a^2 e^{i p}}{R_2}} \left(\left(z + \frac{a^2 e^{i p}}{R_2}\right) \left(\frac{1}{2} \frac{1}{2(z-R_1 e^{i n})} \cdot 2 \frac{R_2}{zR_2 + a^2 e^{i p}}\right) \right) = -\frac{1}{2(a^2 e^{i p} + R_1 e^{i n} R_2)} -\frac{1}{2} \cdot 2R_2$$

$$a_{72} = -\frac{1}{2(a^2 e^{i p} + R_1 e^{i n} R_2)} -\frac{1}{2} \cdot 2R_2$$

Para a_{73}

$$f z = -\frac{1}{2} \frac{1}{2(z-R_1 e^{i n})} \cdot \frac{2}{z + R_2 e^{i p}}$$

$$a_{73} = 0$$

Para a_{74}

$$f z = -\frac{1}{2} i \frac{2}{2(z + R_2 e^{i n})} \frac{Q}{z}$$

$$Res \quad \lim_{z \to 0} \left(z - 0 \left(-\frac{1}{2} i \frac{2}{2(z + R_2 e^{i n})} \frac{Q}{z}\right) \right) = -\frac{1}{2} \frac{i}{R_2 e^{i n}} -\frac{2}{} Q$$

$$a_{74} \quad -\frac{1}{2}\frac{i}{R_2 e^{i n}} \frac{2}{2}Q$$

Para a_{75}

$$f z \quad -i\frac{2}{(z \ R_2 e^{i n})}V_o\frac{a^2}{z^2}$$

$$Res \quad \frac{1}{2-1 !}\lim_{z \ 0}\frac{d^{2-1}}{dz^{2-1}}\left(z-0 \ ^2\left(-i\frac{2}{(z \ R_2 e^{i n})}V_o\frac{a^2}{z^2}\right)\right) \quad \frac{i}{R_2^2 e^{2 i n}} \ 2V_o a^2$$

$$a_{75} \quad \frac{i}{R_2^2 e^{2 i n}} \ 2V_o a^2$$

Para a_{76}

$$f z \quad -\frac{1}{2} \ 1\frac{R_1}{2(zR_1-a^2 e^{i p})}\frac{2}{z \ R_2 e^{i p}}$$

$$Res \quad \lim_{z \ \frac{a^2 e^{i p}}{R_1}}\left(\left(z-\frac{a^2 e^{i p}}{R_1}\right)\left(-\frac{1}{2} \ 1\frac{R_1}{2(zR_1-a^2 e^{i p})}\frac{2}{z \ R_2 e^{i p}}\right)\right) \quad -\frac{1}{2(a^2 e^{i p} \ R_2 e^{i p}R_1)} \ 1\frac{R_1}{2} \ 2$$

$$a_{76} \quad -\frac{1}{2(a^2 e^{i p} \ R_2 e^{i p}R_1)} \ 1\frac{R_1}{2} \ 2$$

Para a_{77}

$$f z \quad -\frac{1}{2} \ 1\frac{R_1}{2(zR_1-a^2 e^{i p})}R_2\frac{2}{zR_2 \ a^2 e^{i n}}$$

$$Res_1 \quad \lim_{z \ \frac{a^2 e^{i p}}{R_1}}\left(\left(z-\frac{a^2 e^{i p}}{R_1}\right)\left(-\frac{1}{2} \ 1\frac{R_1}{2(zR_1-a^2 e^{i p})}R_2\frac{2}{zR_2 \ a^2 e^{i n}}\right)\right)$$

$$-\frac{1}{2a^2(e^{i n}R_1 \ e^{i p}R_2)} \ 1\frac{R_1}{2}R_2 \ 2$$

$$Res_2 \quad \lim_{z \ -\frac{a^2 e^{i n}}{R_2}}\left(\left(z \ \frac{a^2 e^{i n}}{R_2}\right)\left(-\frac{1}{2} \ 1\frac{R_1}{2(zR_1-a^2 e^{i p})}R_2\frac{2}{zR_2 \ a^2 e^{i n}}\right)\right)$$

$$\frac{1}{2a^2(e^{i n}R_1 \ e^{i p}R_2)} \ 1\frac{R_1}{2}R_2 \ 2$$

$$a_{77} \quad Res_1 \quad Res_2 \quad 0$$

Para a_{78}

$$f(z) = -\frac{1}{4} \cdot \frac{1}{2} \cdot \frac{R_1^2}{\left(zR_1 - a^2 e^{i\,p}\right)^2}$$

$$Res = \frac{1}{2-1\,!} \lim_{z \to \frac{a^2 e^{i\,p}}{R_1}} \frac{d^{2-1}}{dz^{2-1}} \left(\left(z - \frac{a^2 e^{i\,p}}{R_1}\right)^2 \left(-\frac{1}{4} \cdot \frac{1}{2} \cdot \frac{R_1^2}{\left(zR_1 - a^2 e^{i\,p}\right)^2}\right) \right) = 0$$

$$a_{78} = 0$$

Para a_{79}

$$f(z) = \frac{1}{2} \cdot \frac{1}{\left(zR_1 - a^2 e^{i\,p}\right)} \cdot \frac{R_1}{2} \cdot \frac{2}{z\,R_2 e^{i\,n}}$$

$$Res = \lim_{z \to \frac{a^2 e^{i\,p}}{R_1}} \left(\left(z - \frac{a^2 e^{i\,p}}{R_1}\right) \left(\frac{1}{2} \cdot \frac{1}{\left(zR_1 - a^2 e^{i\,p}\right)} \cdot \frac{R_1}{2} \cdot \frac{2}{z\,R_2 e^{i\,n}}\right) \right) = \frac{1}{2\left(a^2 e^{i\,p}\,R_2 e^{i\,n}R_1\right)} \cdot 1 \cdot \frac{R_1}{2} \cdot 2$$

$$a_{79} = \frac{1}{2\left(a^2 e^{i\,p}\,R_2 e^{i\,n}R_1\right)} \cdot 1 \cdot \frac{R_1}{2} \cdot 2$$

Para a_{80}

$$f(z) = \frac{1}{2} \cdot \frac{1}{\left(zR_1 - a^2 e^{i\,p}\right)} \cdot \frac{R_1}{2} \cdot \frac{R_2}{zR_2\,a^2 e^{i\,p}}$$

$$Res_1 = \lim_{z \to \frac{a^2 e^{i\,p}}{R_1}} \left(\left(z - \frac{a^2 e^{i\,p}}{R_1}\right) \left(\frac{1}{2} \cdot \frac{1}{\left(zR_1 - a^2 e^{i\,p}\right)} \cdot \frac{R_1}{2} \cdot \frac{R_2}{zR_2\,a^2 e^{i\,p}}\right) \right)$$

$$\frac{1}{2a^2\left(e^{i\,p}R_2\,e^{i\,p}R_1\right)} \cdot 1 \cdot \frac{R_1}{2} \cdot 2R_2$$

$$Res_2 = \lim_{z \to -\frac{a^2 e^{i\,p}}{R_2}} \left(\left(z \cdot \frac{a^2 e^{i\,p}}{R_2}\right) \left(\frac{1}{2} \cdot \frac{1}{\left(zR_1 - a^2 e^{i\,p}\right)} \cdot \frac{R_1}{2} \cdot \frac{R_2}{zR_2\,a^2 e^{i\,p}}\right) \right)$$

$$- \frac{1}{2a^2\left(e^{i\,p}R_2\,e^{i\,p}R_1\right)} \cdot 1 \cdot \frac{R_1}{2} \cdot 2R_2$$

$$a_{80} = Res_1 + Res_2 = 0$$

Para a_{81}

$$f(z) = i \cdot \frac{2}{\left(z\,R_2 e^{i\,n}\right)}V_o$$

$$a_{81} = 0$$

Para a_{82}

$$f\ z \quad -\frac{1}{2}\ \frac{2}{2(z\ R_2 e^{i\ n})}\ \overline{z}$$

$$Res \quad \lim_{z\ 0}\left(\ z-0\ \left(-\frac{1}{2}\ \frac{2}{2(z\ R_2 e^{i\ n})}\ \overline{z}\right)\right) \quad -\frac{1}{2R_2 e^{i\ n}}\ \frac{2}{2}$$

$$a_{82} \quad -\frac{1}{2R_2 e^{i\ n}}\ \frac{2}{2}$$

Para a_{83}

$$f\ z \quad -\frac{1}{4}\ \frac{\frac{2}{2}}{2(z\ R_2 e^{i\ n})^2}$$

$$a_{83} \quad 0$$

Para a_{84}

$$f\ z \quad -\frac{1}{2}\ \frac{\frac{2}{2}}{2(z\ R_2 e^{i\ n})}\ \frac{R_2}{zR_2\ a^2 e^{i\ p}}$$

$$Res \quad \lim_{z\ -\frac{a^2 e^{i\ p}}{R_2}}\left(\left(z\ \frac{a^2 e^{i\ p}}{R_2}\right)\left(-\frac{1}{2}\ \frac{\frac{2}{2}}{2(z\ R_2 e^{i\ n})}\ \frac{R_2}{zR_2\ a^2 e^{i\ p}}\right)\right) \quad \frac{1}{2(a^2 e^{i\ p}-e^{i\ n}R_2^2)}\ \frac{\frac{2}{2}}{}R_2$$

$$a_{84} \quad \frac{1}{2(a^2 e^{i\ p}-e^{i\ n}R_2^2)}\ \frac{\frac{2}{2}}{}R_2$$

Para a_{85}

$$f\ z \quad \frac{1}{2}\ \frac{\frac{2}{2}}{2(z\ R_2 e^{i\ n})(z\ R_2 e^{i\ p})}$$

$$a_{85} \quad 0$$

Para a_{86}

$$f\ z \quad \frac{1}{2}\frac{\frac{2}{2}}{{}^{2}(z\ R_2 e^{i\ n})}\frac{R_2}{zR_2\ a^2 e^{i\ n}}$$

$$Res \quad \lim_{z\ -\frac{a^2 e^{i\ n}}{R_2}}\left(\left(z\ \frac{a^2 e^{i\ n}}{R_2}\right)\left(\frac{1}{2}\frac{\frac{2}{2}}{{}^{2}(z\ R_2 e^{i\ n})}\frac{R_2}{zR_2\ a^2 e^{i\ n}}\right)\right) \quad \frac{1}{2e^{i\ n}(-a^2\ R_2^2)}\frac{-\frac{2}{2}}{2}R_2$$

$$a_{86} \quad \frac{1}{2e^{i\ n}(-a^2\ R_2^2)}\frac{-\frac{2}{2}}{2}R_2$$

Para a_{87}

$$f\ z \quad \frac{1}{2}i\frac{\frac{2}{2}}{{}^{2}(z\ R_2 e^{i\ p})}\frac{Q}{z}$$

$$Res \quad \lim_{z\ 0}\left(z-0\ \left(\frac{1}{2}i\frac{\frac{2}{2}}{{}^{2}(z\ R_2 e^{i\ p})}\frac{Q}{z}\right)\right) \quad \frac{1}{2}\frac{i}{R_2 e^{i\ p}}\frac{-\frac{2}{2}}{2}Q$$

$$a_{87} \quad \frac{1}{2}\frac{i}{R_2 e^{i\ p}}\frac{-\frac{2}{2}}{2}Q$$

Para a_{88}

$$f\ z \quad i\frac{\frac{2}{2}}{(z\ R_2 e^{i\ p})}V_o\frac{a^2}{z^2}$$

$$Res \quad \frac{1}{2-1\ !}\lim_{z\ 0}\frac{d^{2-1}}{dz^{2-1}}\left(z-0\ {}^2\left(i\frac{\frac{2}{2}}{(z\ R_2 e^{i\ p})}V_o\frac{a^2}{z^2}\right)\right) \quad -\frac{i}{R_2^2 e^{2\ i\ p}}\ _2 V_o a^2$$

$$a_{88} \quad -\frac{i}{R_2^2 e^{2\ i\ p}}\ _2 V_o a^2$$

Para a_{89}

$$f\ z \quad \frac{1}{2}\frac{\frac{2}{2}}{{}^{2}(z\ R_2 e^{i\ p})}\frac{}{z}$$

$$Res \quad \lim_{z\ 0}\left(z-0\ \left(\frac{1}{2}\frac{\frac{2}{2}}{{}^{2}(z\ R_2 e^{i\ p})}\frac{}{z}\right)\right) \quad \frac{1}{2R_2 e^{i\ p}}\frac{-\frac{2}{2}}{2}$$

$$a_{89} \quad \frac{1}{2R_2 e^{i\ p}}\frac{-\frac{2}{2}}{2}$$

Para a_{90}

$$f z \quad -\frac{1}{4} \frac{\frac{2}{2}}{{}^2(z\ R_2 e^{i\ p})^2}$$

$$a_{90} \quad 0$$

Para a_{91}

$$f z \quad -\frac{1}{4}\ \frac{2}{2}\frac{R_2^2}{{}^2(zR_2\ a^2 e^{i\ p})^2}$$

$$Res \quad \frac{1}{2-1\ !}\ \lim_{z\ -\frac{a^2 e^{i\ p}}{R_2}}\ \frac{d^{2-1}}{dz^{2-1}}\left(\left(z \quad \frac{a^2 e^{i\ p}}{R_2}\right)^2\left(-\frac{1}{4}\ \frac{2}{2}\frac{R_2^2}{{}^2(zR_2\ a^2 e^{i\ p})^2}\right)\right) \quad 0$$

$$a_{91} \quad 0$$

Para a_{92}

$$f z \quad \frac{1}{2}\ \frac{2}{2}\frac{R_2}{{}^2(zR_2\ a^2 e^{i\ p})(z\ R_2 e^{i\ p})}$$

$$Res \quad \lim_{z\ -\frac{a^2 e^{i\ p}}{R_2}}\left(\left(z \quad \frac{a^2 e^{i\ p}}{R_2}\right)\left(\frac{1}{2}\ \frac{2}{2}\frac{R_2}{{}^2(zR_2\ a^2 e^{i\ p})(z\ R_2 e^{i\ p})}\right)\right) \quad \frac{1}{2e^{i\ p}(-a^2\ R_2^2)}R_2\ \frac{\frac{2}{2}}{2}$$

$$a_{92} \quad \frac{1}{2e^{i\ p}(-a^2\ R_2^2)}R_2\ \frac{\frac{2}{2}}{2}$$

Para a_{93}

$$f z \quad \frac{1}{2}\ \frac{2}{2}\frac{R_2^2}{{}^2(zR_2\ a^2 e^{i\ p})(zR_2\ a^2 e^{i\ n})}$$

$$Res_1 \quad \lim_{z\ -\frac{a^2 e^{i\ p}}{R_2}}\left(\left(z \quad \frac{a^2 e^{i\ p}}{R_2}\right)\left(\frac{1}{2}\ \frac{2}{2}\frac{R_2^2}{{}^2(zR_2\ a^2 e^{i\ p})(zR_2\ a^2 e^{i\ n})}\right)\right) \quad \frac{1}{2}\frac{R_2}{a^2(-e^{i\ p}\ e^{i\ n})}\ \frac{\frac{2}{2}}{2}$$

$$Res_2 \quad \lim_{z\ -\frac{a^2 e^{i\ n}}{R_2}}\left(\left(z \quad \frac{a^2 e^{i\ n}}{R_2}\right)\left(\frac{1}{2}\ \frac{2}{2}\frac{R_2^2}{{}^2(zR_2\ a^2 e^{i\ p})(zR_2\ a^2 e^{i\ n})}\right)\right) \quad -\frac{1}{2}\frac{R_2}{a^2(-e^{i\ p}\ e^{i\ n})}\ \frac{\frac{2}{2}}{2}$$

$$a_{93} \quad Res_1\ Res_2 \quad 0$$

Para a_{94}

$$f z \quad -\frac{1}{2}i \quad 2\frac{R_2}{^2(zR_2 \quad a^2e^i \, p)} \frac{Q}{z}$$

$$Res_1 \quad \lim_{z \quad -\frac{a^2e^i \, p}{R_2}} \left(\left(z \quad \frac{a^2e^i \, p}{R_2} \right) \left(-\frac{1}{2}i \quad 2\frac{R_2}{^2(zR_2 \quad a^2e^i \, p)} \frac{Q}{z} \right) \right) \quad \frac{1}{2}\frac{i}{a^2e^i \, p} \quad 2\frac{R_2}{2}Q$$

$$Res_2 \quad \lim_{z \quad 0} \left(z - 0 \left(-\frac{1}{2}i \quad 2\frac{R_2}{^2(zR_2 \quad a^2e^i \, p)} \frac{Q}{z} \right) \right) \quad -\frac{1}{2}\frac{i}{a^2e^i \, p} \quad 2\frac{R_2}{2}Q$$

$$a_{94} \quad Res_1 \quad Res_2 \quad 0$$

Para a_{95}

$$f z \quad i \quad 2\frac{R_2}{(zR_2 \quad a^2e^i \, p)}V_o$$

$$Res \quad \lim_{z \quad -\frac{a^2e^i \, p}{R_2}} \left(\left(z \quad \frac{a^2e^i \, p}{R_2} \right) \left(i \quad 2\frac{R_2}{(zR_2 \quad a^2e^i \, p)}V_o \right) \right) \quad i \, \frac{2}{} V_o$$

$$a_{95} \quad i \, \frac{2}{} V_o$$

Para a_{96}

$$f z \quad -i \quad 2\frac{R_2}{(zR_2 \quad a^2e^i \, p)}V_o \frac{a^2}{z^2}$$

$$Res_1 \quad \lim_{z \quad -\frac{a^2e^i \, p}{R_2}} \left(\left(z \quad \frac{a^2e^i \, p}{R_2} \right) \left(-i \quad 2\frac{R_2}{(zR_2 \quad a^2e^i \, p)}V_o \frac{a^2}{z^2} \right) \right) \quad -\frac{i}{a^2e^{2 \, i \, p}}R_2^2 \, \frac{2}{} V_o$$

$$Res_2 \quad \frac{1}{2-1 \, !} \lim_{z \quad 0} \frac{d^{2-1}}{dz^{2-1}} \left(z - 0 \, ^2 \left(-i \quad 2\frac{R_2}{(zR_2 \quad a^2e^i \, p)}V_o \frac{a^2}{z^2} \right) \right) \quad \frac{i}{a^2e^{2 \, i \, p}}R_2^2 \, \frac{2}{} V_o$$

$$a_{96} \quad Res_1 \quad Res_2 \quad 0$$

Para a_{97}

$$f z \quad -\frac{1}{2} \quad 2\frac{R_2}{^2(zR_2 \quad a^2e^i \, p)} \frac{}{z}$$

$$Res_1 \quad \lim_{z \quad -\frac{a^2e^i \, p}{R_2}} \left(\left(z \quad \frac{a^2e^i \, p}{R_2} \right) \left(-\frac{1}{2} \quad 2\frac{R_2}{^2(zR_2 \quad a^2e^i \, p)} \frac{}{z} \right) \right) \quad \frac{1}{2a^2e^i \, p} \quad 2\frac{R_2}{2}$$

$$Res_2 \quad \lim_{z \to 0}\left(z - 0 \left(-\frac{1}{2} \quad 2\frac{R_2}{2(zR_2 \ a^2 e^{i \ p})} \ z \right)\right) \quad -\frac{1}{2a^2 e^{i \ p}} \quad 2\frac{R_2}{2}$$

$$a_{97} \quad Res_1 \quad Res_2 \quad 0$$

Para a_{98}

$$f \ z \quad -\frac{1}{2}\frac{\frac{2}{2}}{2(z \ R_2 e^{i \ p})}\frac{R_2}{zR_2 \ a^2 e^{i \ n}}$$

$$Res \quad \lim_{z \to -\frac{a^2 e^{i \ n}}{R_2}}\left(\left(z \quad \frac{a^2 e^{i \ n}}{R_2}\right)\left(-\frac{1}{2}\frac{\frac{2}{2}}{2(z \ R_2 e^{i \ p})}\frac{R_2}{zR_2 \ a^2 e^{i \ n}}\right)\right) \quad \frac{1}{2(a^2 e^{i \ n} - R_2^2 e^{i \ p})}\frac{-\frac{2}{2}}{2}R_2$$

$$a_{98} \quad \frac{1}{2(a^2 e^{i \ n} - R_2^2 e^{i \ p})}\frac{-\frac{2}{2}}{2}R_2$$

Para a_{99}

$$f \ z \quad -iR_2\frac{2}{(zR_2 \ a^2 e^{i \ n})}V_o$$

$$Res \quad \lim_{z \to -\frac{a^2 e^{i \ n}}{R_2}}\left(\left(z \quad \frac{a^2 e^{i \ n}}{R_2}\right)\left(-iR_2\frac{2}{(zR_2 \ a^2 e^{i \ n})}V_o\right)\right) \quad -i\frac{2}{}V_o$$

$$a_{99} \quad -i\frac{2}{}V_o$$

Para a_{100}

$$f \ z \quad iR_2\frac{2}{(zR_2 \ a^2 e^{i \ n})}V_o\frac{a^2}{z^2}$$

$$Res_1 \quad \lim_{z \to -\frac{a^2 e^{i \ n}}{R_2}}\left(\left(z \quad \frac{a^2 e^{i \ n}}{R_2}\right)\left(iR_2\frac{2}{(zR_2 \ a^2 e^{i \ n})}V_o\frac{a^2}{z^2}\right)\right) \quad \frac{i}{a^2 e^{2 \ i \ n}}R_2^2\frac{-2}{}V_o$$

$$Res_2 \quad \frac{1}{2-1 \ !}\lim_{z \to 0}\frac{d^{2-1}}{dz^{2-1}}\left(z - 0 \ ^2\left(iR_2\frac{2}{(zR_2 \ a^2 e^{i \ n})}V_o\frac{a^2}{z^2}\right)\right) \quad -\frac{i}{a^2 e^{2 \ i \ n}}R_2^2\frac{-2}{}V_o$$

$$a_{100} \quad Res_1 \quad Res_2 \quad 0$$

Para a_{101}

$$f(z) = \frac{1}{2}R_2 \frac{2}{2\left(zR_2 - a^2 e^{i n}\right)} z$$

$$Res_1 = \lim_{z \to -\frac{a^2 e^{i n}}{R_2}} \left(\left(z - \frac{a^2 e^{i n}}{R_2}\right)\left(\frac{1}{2}R_2 \frac{2}{2\left(zR_2 - a^2 e^{i n}\right)} z\right)\right) = -\frac{1}{2a^2 e^{i n}}R_2 \frac{2}{2}$$

$$Res_2 = \lim_{z \to 0}\left(z - 0\left(\frac{1}{2}R_2 \frac{2}{2\left(zR_2 - a^2 e^{i n}\right)} z\right)\right) = \frac{1}{2a^2 e^{i n}}R_2 \frac{2}{2}$$

$$a_{101} = Res_1 + Res_2 = 0$$

Para a_{102}

$$f(z) = iV_o \frac{}{z}$$

$$Res = \lim_{z \to 0} z - 0 \, iV_o \frac{}{z} = iV_o -$$

$$a_{102} = iV_o -$$

Para a_{103}

$$f(z) = -V_o \frac{Q}{z}$$

$$Res = \lim_{z \to 0}\left(z - 0\left(-V_o \frac{Q}{z}\right)\right) = -V_o \frac{Q}{}$$

$$a_{103} = -V_o \frac{Q}{}$$

Para a_{104}

$$f(z) = -\frac{1}{4}R_2^2 \frac{\frac{2}{2}}{2\left(zR_2 - a^2 e^{i n}\right)^2}$$

$$Res = \frac{1}{2-1 !} \lim_{z \to -\frac{a^2 e^{i n}}{R_2}} \frac{d^{2-1}}{dz^{2-1}}\left(\left(z - \frac{a^2 e^{i n}}{R_2}\right)^2\left(-\frac{1}{4}R_2^2 \frac{\frac{2}{2}}{2\left(zR_2 - a^2 e^{i n}\right)^2}\right)\right) = 0$$

$$a_{104} = 0$$

Para a_{105}

$$f\ z\quad \frac{1}{2}iR_2\frac{2}{2\left(zR_2\ a^2e^{i\ n}\right)}\ \frac{Q}{z}$$

$$Res_1\quad \lim_{z\ -\frac{a^2e^{i\ n}}{R_2}}\left(\left(z\quad \frac{a^2e^{i\ n}}{R_2}\right)\left(\frac{1}{2}iR_2\frac{2}{2\left(zR_2\ a^2e^{i\ n}\right)}\ \frac{Q}{z}\right)\right)\quad -\frac{1}{2}\frac{i}{a^2e^{i\ n}}R_2\frac{2}{2}Q$$

$$Res_2\quad \lim_{z\ 0}\left(z-0\ \left(\frac{1}{2}iR_2\frac{2}{2\left(zR_2\ a^2e^{i\ n}\right)}\ \frac{Q}{z}\right)\right)\quad \frac{1}{2}\frac{i}{a^2e^{i\ n}}R_2\frac{2}{2}Q$$

$$a_{105}\quad Res_1\quad Res_2\quad 0$$