3.5.- ECUACIONES LOCALES DE FALTA: COMPONENTES SIMETRICAS

3.5.1 Falta Simple

La Falta Simple está representada en la Figura 3.3.a
Las Faltas ag, bg, cg están representadas en la Figura 3.3.b
Las Faltas bc, ca, ab están representadas en la Figura 3.3.c
Las Faltas bcg, cag, abg están representadas en la Figura 3.3.d
La Falta abc está representada en la Figura 3.3.e
La Falta abcg está representada en la Figura 3.3.f

Tabla 3.5.1

Falta	Ecuaciones Locales de Falta en m: Componentes Simétricas
ag	$I_{m0}-I_{m1}=0 \qquad I_{m0}-I_{m2}=0$ $-3R_{fm}I_{m0}+V_{m0}+V_{m1}+V_{m2}=0$
bg	$I_{m0}-a^2I_{m1}=0 \qquad I_{m0}-aI_{m2}=0$ $-R_{fm}\left(I_{m0}+a^2I_{m1}+aI_{m2}\right)+V_{m0}+a^2V_{m1}+aV_{m2}=0$
cg	$I_{m0}-aI_{m1}=0 \qquad I_{m0}-a^2I_{m2}=0$ $-R_{fm}\left(I_{m0}+aI_{m1}+a^2I_{m2}\right)+V_{m0}+aV_{m1}+a^2V_{m2}=0$
ab	$I_{m0}=0 \qquad I_{m1}+aI_{m2}=0$ $-R_{fm}\left(I_{m1}-aI_{m2}\right)+V_{m1}-aV_{m2}=0$
bc	$I_{m0}=0 \qquad I_{m1}+I_{m2}=0$ $-R_{fm}\left(I_{m1}-I_{m2}\right)+V_{m1}-V_{m2}=0$
ca	$I_{m0}=0 \qquad I_{m1}+a^2I_{m2}=0$ $-R_{fm}\left(I_{m1}-a^2I_{m2}\right)+V_{m1}-a^2V_{m2}=0$
abg	$I_{m0}+aI_{m1}+a^2I_{m2}=0 \qquad -R_{fm}\left(a^2I_{m1}-I_{m2}\right)+a^2V_{m1}-V_{m2}=0$ $-\left(R_{fm}+3R_{gm}\right)I_{m0}-R_{fm}I_{m1}-R_{fm}I_{m2}+V_{m0}+V_{m1}+V_{m2}=0$
bcg	$I_{m0}+I_{m1}+I_{m2}=0 \qquad -R_{fm}\left(I_{m1}-I_{m2}\right)+V_{m1}-V_{m2}=0$ $-\left(R_{fm}+3R_{gm}\right)I_{m0}-a^2R_{fm}I_{m1}-aR_{fm}I_{m2}+V_{m0}+a^2V_{m1}+aV_{m2}=0$
cag	$I_{m0}+a^2I_{m1}+aI_{m2}=0 \qquad -R_{fm}\left(I_{m1}-a^2I_{m2}\right)+V_{m1}-a^2V_{m2}=0$ $-\left(R_{fm}+3R_{gm}\right)I_{m0}-aR_{fm}I_{m1}-a^2R_{fm}I_{m2}+V_{m0}+aV_{m1}+a^2V_{m2}=0$
abc	$I_{m0}=0 \qquad V_{m0}=0$ $-R_{fm}\left(I_{m1}+I_{m2}\right)+V_{m1}+V_{m2}=0$
abcg	$-\left(R_{fm}+3R_{gm}\right)I_{m0}+V_{m0}=0 \qquad -R_{fm}\left(I_{m1}+I_{m2}\right)+V_{m1}+V_{m2}=0$ $-R_{fm}\left(aI_{m1}+I_{m2}\right)+aV_{m1}+V_{m2}=0$

3.5.2 Falta Doble

La Falta Doble está representada en la Figura 3.3.g
Las Ecuaciones Locales de Falta en p son similares a las Ecuaciones Locales de falta en m, expuestas anteriormente para la Falta Simple en m. No reflejaremos, por tanto, estas Ecuaciones para la Falta en m, remitiéndonos a lo anterior. Si lo haremos para la Falta en p, pues aunque son similares cambia la nomenclatura al pasar m a p.
Las Faltas ag, bg, cg están representadas en la Figura 3.3.b
Las Faltas bc, ca, ab están representadas en la Figura 3.3.c
Las Faltas bcg, cag, abg están representadas en la Figura 3.3.d
La Falta abc está representada en la Figura 3.3.e
La Falta abcg está representada en la Figura 3.3.f

Tabla 3.5.2

Falta	Condiciones Locales de Falta en p: Componentes Simétricas
ag	$I_{p0}-I_{p1}=0 \qquad I_{p0}-I_{p2}=0$ $-3R_{fp}I_{p0}+V_{p0}+V_{p1}+V_{p2}=0$
bg	$I_{p0}-a^2I_{p1}=0 \qquad I_{p0}-aI_{p2}=0$ $-R_{fp}\left(I_{p0}+a^2I_{p1}+aI_{p2}\right)+V_{p0}+a^2V_{p1}+aV_{p2}=0$
cg	$I_{p0}-aI_{p1}=0 \qquad I_{p0}-a^2I_{p2}=0$ $-R_{fp}\left(I_{p0}+aI_{p1}+a^2I_{p2}\right)+V_{p0}+aV_{p1}+a^2V_{p2}=0$
ab	$I_{p0}=0 \qquad I_{p1}+aI_{p2}=0$ $-R_{fp}\left(I_{p1}-aI_{p2}\right)+V_{p1}-aV_{p2}=0$
bc	$I_{p0}=0 \qquad I_{p1}+I_{p2}=0$ $-R_{fp}\left(I_{p1}-I_{p2}\right)+V_{p1}-V_{p2}=0$
ca	$I_{p0}=0 \qquad I_{p1}+a^2I_{p2}=0$ $-R_{fp}\left(I_{p1}-a^2I_{p2}\right)+V_{p1}-a^2V_{p2}=0$
abg	$I_{p0}+aI_{p1}+a^2I_{p2}=0 \qquad -R_{fp}\left(a^2I_{p1}-I_{p2}\right)+a^2V_{p1}-V_{p2}=0$ $-\left(R_{fp}+3R_{gp}\right)I_{p0}-R_{fp}I_{p1}-R_{fp}I_{p2}+V_{p0}+V_{p1}+V_{p2}=0$
bcg	$I_{p0}+I_{p1}+I_{p2}=0 \qquad -R_{fp}\left(I_{p1}-I_{p2}\right)+V_{p1}-V_{p2}=0$ $-\left(R_{fp}+3R_{gp}\right)I_{p0}-a^2R_{fp}I_{p1}-aR_{fp}I_{p2}+V_{p0}+a^2V_{p1}+aV_{p2}=0$
cag	$I_{p0}+a^2I_{p1}+aI_{p2}=0 \qquad -R_{fp}\left(I_{p1}-a^2I_{p2}\right)+V_{p1}-a^2V_{p2}=0$ $-\left(R_{fp}+3R_{gp}\right)I_{p0}-aR_{fp}I_{p1}-a^2R_{fp}I_{p2}+V_{p0}+aV_{p1}+a^2V_{p2}=0$
abc	$I_{p0}=0 \qquad V_{p0}=0$ $-R_{fp}\left(I_{p1}+I_{p2}\right)+V_{p1}+V_{p2}=0$
abcg	$-\left(R_{fp}+3R_{gp}\right)I_{p0}+V_{p0}=0 \qquad -R_{fp}\left(I_{p1}+I_{p2}\right)+V_{p1}+V_{p2}=0$ $-R_{fp}\left(aI_{p1}+I_{p2}\right)+aV_{p1}+V_{p2}=0$

3.5.3 Falta Intercircuito entre Líneas de Igual Tensión (m=p)

La Falta Intercircuito entre Líneas de Igual Tensión está representada en la Figura 3.3.h La Falta Intercircuito mb-pc está representada en las Figura 3.3.i y la Falta Intercircuito mb-pc-g está representada en las Figura 3.3.j

Tabla 3.5.3, Parte 1	
Falta	Falta Intercircuito entre Líneas de Igual Tensión Condiciones Locales de Falta en m,p con m=p Componentes Simétricas
ma-pa	$I_{m0}-I_{m1}=0 \quad I_{m0}-I_{m2}=0 \quad I_{p0}-I_{p1}=0 \quad I_{p0}-I_{p2}=0$ $I_{m0}+I_{p0}=0$ $-6R_f I_{m0}+V_{m0}+V_{m1}+V_{m2}-V_{p0}-V_{p1}-V_{p2}=0$
mb-pc	$I_{m0}-a^2 I_{m1}=0 \quad I_{m0}-aI_{m2}=0 \quad I_{p0}-aI_{p1}=0 \quad I_{p0}-a^2 I_{p2}=0$ $I_{m0}+I_{p0}=0$ $-6R_f I_{m0}+V_{m0}+a^2V_{m1}+aV_{m2}-V_{p0}-aV_{p1}-a^2V_{p2}=0$
mc-pb	$I_{m0}-aI_{m1}=0 \quad I_{m0}-a^2 I_{m2}=0 \quad I_{p0}-a^2 I_{p1}=0 \quad I_{p0}-aI_{p2}=0$ $I_{m0}+I_{p0}=0$ $-6R_f I_{m0}+V_{m0}+aV_{m1}+a^2V_{m2}-V_{p0}-a^2V_{p1}-aV_{p2}=0$
ma-pa-g	$I_{m0}-I_{m1}=0 \quad I_{m0}-I_{m2}=0 \quad I_{p0}-I_{p1}=0 \quad I_{p0}-I_{p2}=0$ $-3\left(R_f+R_g\right)I_{m0}+V_{m0}+V_{m1}+V_{m2}-3R_g I_{p0}=0$ $-3R_g I_{m0}-3\left(R_f+R_g\right)I_{p0}+V_{p0}+V_{p1}+V_{p2}=0$
mb-pc-g	$I_{m0}-a^2 I_{m1}=0 \quad I_{m0}-aI_{m2}=0 \quad I_{p0}-aI_{p1}=0 \quad I_{p0}-a^2 I_{p2}=0$ $-3\left(R_f+R_g\right)I_{m0}+V_{m0}+a^2V_{m1}+aV_{m2}-3R_g I_{p0}=0$ $-3R_g I_{m0}-3\left(R_f+R_g\right)I_{p0}+V_{p0}+aV_{p1}+a^2V_{p2}=0$
mc-pb-g	$I_{m0}-aI_{m1}=0 \quad I_{m0}-a^2 I_{m2}=0 \quad I_{p0}-a^2 I_{p1}=0 \quad I_{p0}-aI_{p2}=0$ $-3\left(R_f+R_g\right)I_{m0}+V_{m0}+aV_{m1}+a^2V_{m2}-3R_g I_{p0}=0$ $-3R_g I_{m0}-3\left(R_f+R_g\right)I_{p0}+V_{p0}+a^2V_{p1}+aV_{p2}=0$
ma-pa-pb	$I_{m0}-I_{m1}=0 \quad I_{m0}-I_{m2}=0 \quad I_{p0}+aI_{p1}+a^2 I_{p2}=0 \quad I_{m0}+I_{p0}=0$ $-4R_f I_{m0}+V_{m0}+V_{m1}+V_{m2}+R_f I_{p1}+R_f I_{p2}-V_{p0}-V_{p1}-V_{p2}=0$ $-4R_f I_{m0}+V_{m0}+V_{m1}+V_{m2}+R_f a^2 I_{p1}+R_f aI_{p2}-V_{p0}-a^2V_{p1}-aV_{p2}=0$
mb-pa-pc	$I_{m0}-a^2 I_{m1}=0 \quad I_{m0}-aI_{m2}=0 \quad I_{p0}+a^2 I_{p1}+aI_{p2}=0 \quad I_{m0}+I_{p0}=0$ $-4R_f I_{m0}+V_{m0}+a^2V_{m1}+aV_{m2}+R_f I_{p1}+R_f I_{p2}-V_{p0}-V_{p1}-V_{p2}=0$ $-4R_f I_{m0}+V_{m0}+a^2V_{m1}+aV_{m2}+R_f aI_{p1}+R_f a^2 I_{p2}-V_{p0}-aV_{p1}-a^2V_{p2}=0$
mc-pb-pc	$I_{m0}-aI_{m1}=0 \quad I_{m0}-a^2 I_{m2}=0 \quad I_{p0}+I_{p1}+I_{p2}=0 \quad I_{m0}+I_{p0}=0$ $-4R_f I_{m0}+V_{m0}+aV_{m1}+a^2V_{m2}+R_f a^2 I_{p1}+R_f aI_{p2}-V_{p0}-a^2V_{p1}-aV_{p2}=0$ $-4R_f I_{m0}+V_{m0}+aV_{m1}+a^2V_{m2}+R_f aI_{p1}+R_f a^2 I_{p2}-V_{p0}-aV_{p1}-a^2V_{p2}=0$

Tabla 3.5.3, Parte 2	
Falta	Falta Intercircuito entre Líneas de Igual Tensión (Continuación) Condiciones Locales de Falta en m,p con m=p Componentes Simétricas
ma-pa-pb-g	$I_{m0}-I_{m1}=0 \quad I_{m0}-I_{m2}=0 \quad I_{p0}+aI_{p1}+a^2I_{p2}=0$ $-3\left(R_f+R_g\right)I_{m0}+V_{m0}+V_{m1}+V_{m2}-3R_gI_{p0}=0$ $-3R_fI_{m0}+V_{m0}+V_{m1}+V_{m2}+R_f\left(1-a\right)I_{p0}+R_f\left(1-a^2\right)I_{p1}-V_{p0}-V_{p1}-V_{p2}=0$ $-3R_fI_{m0}+V_{m0}+V_{m1}+V_{m2}+R_f\left(1-a^2\right)I_{p0}-R_f\left(1-a^2\right)I_{p1}-V_{p0}-a^2V_{p1}-aV_{p2}=0$
mb-pa-pc-g	$I_{m0}-a^2I_{m1}=0 \quad I_{m0}-aI_{m2}=0 \quad I_{p0}+a^2I_{p1}+aI_{p2}=0$ $-3\left(R_f+R_g\right)I_{m0}+V_{m0}+a^2V_{m1}+aV_{m2}-3R_gI_{p0}=0$ $-3R_gI_{m0}-\left(R_f\left(1-a^2\right)+3R_g\right)I_{p0}-R_f\left(1-a\right)I_{p1}+V_{p0}+V_{p1}+V_{p2}=0$ $-3R_gI_{m0}-\left(R_f\left(1-a\right)+3R_g\right)I_{p0}-R_f\left(a-1\right)I_{p1}+V_{p0}+aV_{p1}+a^2V_{p2}=0$
mc-pb-pc-g	$I_{m0}-aI_{m1}=0 \quad I_{m0}-a^2I_{m2}=0 \quad I_{p0}+I_{p1}+I_{p2}=0$ $-3\left(R_f+R_g\right)I_{m0}+V_{m0}+aV_{m1}+a^2V_{m2}-3R_gI_{p0}=0$ $-3R_gI_{m0}-\left(R_f\left(1-a\right)+3R_g\right)I_{p0}-R_f\left(a^2-a\right)I_{p1}+V_{p0}+a^2V_{p1}+aV_{p2}=0$ $-3R_gI_{m0}-\left(R_f\left(1-a^2\right)+3R_g\right)I_{p0}-R_f\left(a-a^2\right)I_{p1}+V_{p0}+aV_{p1}+a^2V_{p2}=0$
ma-pa-pb-pc	$I_{m0}-I_{m1}=0 \quad I_{m0}-I_{m2}=0 \quad I_{m0}+I_{p0}=0$ $-4R_fI_{m0}+V_{m0}+V_{m1}+V_{m2}-V_{p0}=0$ $-R_fI_{p1}+V_{p1}=0$ $-R_fI_{p2}+V_{p2}=0$
ma-pa-pb-pc-g	$I_{m0}-I_{m1}=0 \quad I_{m0}-I_{m2}=0$ $-3\left(R_f+R_g\right)I_{m0}+V_{m0}+V_{m1}+V_{m2}-3R_gI_{p0}=0$ $-3R_gI_{m0}-\left(R_f+3R_g\right)I_{p0}+V_{p0}=0$ $-R_fI_{p1}+V_{p1}=0$ $-R_fI_{p2}+V_{p2}=0$

Tabla 3.5.3, Parte 3	
Falta	Falta Intercircuito entre Líneas de Igual Tensión (Continuación) Condiciones Locales de Falta en m,p con m=p Componentes Simétricas
ma-mb-pa-pb	$I_{m0}+aI_{m1}+a^2I_{m2}=0 \qquad I_{p0}+aI_{p1}+a^2I_{p2}=0 \qquad I_{m0}+I_{p0}=0$ $-a^2R_fI_{m1}+R_fI_{m2}+a^2V_{m1}-V_{m2}=0$ $-2R_fI_{m0}-R_fI_{m1}-R_fI_{m2}+V_{m0}+V_{m1}+V_{m2}+R_fI_{p1}+R_fI_{p2}-V_{p0}-V_{p1}-V_{p2}=0$ $-2R_fI_{m0}-R_fI_{m1}-R_fI_{m2}+V_{m0}+V_{m1}+V_{m2}+a^2R_fI_{p1}+aR_fI_{p2}-V_{p0}-a^2V_{p1}-aV_{p2}=0$
ma-mb-pb-pc	$I_{m0}+aI_{m1}+a^2I_{m2}=0 \qquad I_{p0}+I_{p1}+I_{p2}=0 \qquad I_{m0}+I_{p0}=0$ $-a^2R_fI_{m1}+R_fI_{m2}+a^2V_{m1}-V_{m2}=0$ $-2R_fI_{m0}-R_fI_{m1}-R_fI_{m2}+V_{m0}+V_{m1}+V_{m2}+R_fa^2I_{p1}+R_faI_{p2}-V_{p0}-a^2V_{p1}-aV_{p2}=0$ $-2R_fI_{m0}-R_fI_{m1}-R_fI_{m2}+V_{m0}+V_{m1}+V_{m2}+aR_fI_{p1}+a^2R_fI_{p2}-V_{p0}-aV_{p1}-a^2V_{p2}=0$
ma-mb-pc-pa	$I_{m0}+aI_{m1}+a^2I_{m2}=0 \qquad I_{p0}+a^2I_{p1}+aI_{p2}=0 \qquad I_{m0}+I_{p0}=0$ $-a^2R_fI_{m1}+R_fI_{m2}+a^2V_{m1}-V_{m2}=0$ $-3R_fI_{m0}-\left(1-a^2\right)R_fI_{m1}+V_{m0}+V_{m1}+V_{m2}-\left(a-1\right)R_fI_{p1}-V_{p0}-V_{p1}-V_{p2}=0$ $-2\left(1-a\right)R_fI_{m0}-\left(1-a^2\right)R_fI_{m1}+V_{m0}+V_{m1}+V_{m2}-\left(1-a\right)R_fI_{p1}-V_{p0}-aV_{p1}-a^2V_{p2}=0$
ma-mb-pa-pb-g	$I_{m0}+aI_{m1}+a^2I_{m2}=0 \qquad I_{p0}+aI_{p1}+a^2I_{p2}=0$ $-\left(R_f+3R_g\right)I_{m0}-R_fI_{m1}-R_fI_{m2}+V_{m0}+V_{m1}+V_{m2}-3R_gI_{p0}=0$ $-\left(R_f+3R_g\right)I_{m0}-R_fa^2I_{m1}-R_faI_{m2}+V_{m0}+a^2V_{m1}+aV_{m2}-3R_gI_{p0}=0$ $-3R_gI_{m0}-\left(R_f+3R_g\right)I_{p0}-R_fI_{p1}-R_fI_{p2}+V_{p0}+V_{p1}+V_{p2}=0$ $-3R_gI_{m0}-\left(R_f+3R_g\right)I_{p0}-R_fa^2I_{p1}-R_faI_{p2}+V_{p0}+a^2V_{p1}+aV_{p2}=0$
ma-mb-pb-pc-g	$I_{m0}+aI_{m1}+a^2I_{m2}=0 \qquad I_{p0}+I_{p1}+I_{p2}=0$ $-\left(R_f\left(1-a\right)+3R_g\right)I_{m0}-R_f\left(1-a^2\right)I_{m1}+V_{m0}+V_{m1}+V_{m2}-3R_gI_{p0}=0$ $-\left(R_f\left(1-a^2\right)+3R_g\right)I_{m0}+R_f\left(1-a^2\right)I_{m1}+V_{m0}+a^2V_{m1}+aV_{m2}-3R_gI_{p0}=0$ $-3R_gI_{m0}-\left(R_f\left(1-a\right)+3R_g\right)I_{p0}-a\left(a-1\right)R_fI_{p1}+V_{p0}+a^2V_{p1}+aV_{p2}=0$ $-3R_gI_{m0}-\left(R_f\left(1-a^2\right)+3R_g\right)I_{p0}+a\left(a-1\right)R_fI_{p1}+V_{p0}+aV_{p1}+a^2V_{p2}=0$
ma-mb-pc-pa-g	$I_{m0}+aI_{m1}+a^2I_{m2}=0 \qquad I_{p0}+a^2I_{p1}+aI_{p2}=0$ $-\left(R_f\left(1-a\right)+3R_g\right)I_{m0}-R_f\left(1-a^2\right)I_{m1}+V_{m0}+V_{m1}+V_{m2}-3R_gI_{p0}=0$ $-\left(R_f\left(1-a^2\right)+3R_g\right)I_{m0}+R_f\left(1-a^2\right)I_{m1}+V_{m0}+a^2V_{m1}+aV_{m2}-3R_gI_{p0}=0$ $-3R_gI_{m0}-\left(R_f\left(1-a^2\right)+3R_g\right)I_{p0}-\left(1-a\right)R_fI_{p1}+V_{p0}+V_{p1}+V_{p2}=0$ $-3R_gI_{m0}-\left(R_f\left(1-a\right)+3R_g\right)I_{p0}-\left(a-1\right)R_fI_{p1}+V_{p0}+aV_{p1}+a^2V_{p2}=0$

Tabla 3.5.3, Parte 4	
Falta	Falta Intercircuito entre Líneas de Igual Tensión (Continuación) Condiciones Locales de Falta en m,p con m=p Componentes Simétricas
ma-mb-mc-pa-pb-pc	$I_{m0}+I_{p0}=0 \qquad -2R_f I_{m0}+V_{m0}-V_{p0}=0$ $-R_f I_{m1}+V_{m1}=0 \qquad -R_f I_{m2}+V_{m2}=0$ $-R_f I_{p1}+V_{p1}=0 \qquad -R_f I_{p2}+V_{p2}=0$
ma-mb-mc-pa-pb-pc-g	$-\left(R_f+3R_g\right)I_{m0}+V_{m0}-3R_g I_{p0}=0$ $-R_f I_{m1}+V_{m1}=0 \qquad -R_f I_{m2}+V_{m2}=0$ $-3R_g I_{m0}-\left(R_f+3R_g\right)I_{p0}+V_{p0}=0$ $-R_f I_{p1}+V_{p1}=0 \qquad -R_f I_{p2}+V_{p2}=0$

3.5.4 Falta Intercircuito entre Líneas de Diferente Tensión (m=p)

La Falta Intercircuito entre Líneas de Diferente Tensión (m=p) está representada en la Figura 3.3.k
La Falta Intercircuito mb-pc está representada en las Figura 3.3.l y la Falta Intercircuito mb-pc-g está representada en las Figura 3.3.m

Tabla 3.5.4, Parte 1	
Falta	Falta Intercircuito entre Líneas de Diferente Tensión Condiciones Locales de Falta en m,p con m=p Componentes Simétricas (Valores en pu)
ma-pa	$I_{m0}-I_{m1}=0 \quad I_{m0}-I_{m2}=0 \quad I_{p0}-I_{p1}=0 \quad I_{p0}-I_{p2}=0$ $I_{m0}\left(I_B\right)_{AT}+I_{p0}\left(I_B\right)_{BT}=0$ $-6R_f I_{m0}\left(I_B\right)_{AT}+\left(V_{m0}+V_{m1}+V_{m2}\right)\left(V_B\right)_{AT}-\left(V_{p0}+V_{p1}+V_{p2}\right)\left(V_B\right)_{BT}=0$
mb-pc	$I_{m0}-a^2 I_{m1}=0 \quad I_{m0}-aI_{m2}=0 \quad I_{p0}-aI_{p1}=0 \quad I_{p0}-a^2 I_{p2}=0$ $I_{m0}\left(I_B\right)_{AT}+I_{p0}\left(I_B\right)_{BT}=0$ $-6R_f I_{m0}\left(I_B\right)_{AT}+\left(V_{m0}+a^2V_{m1}+aV_{m2}\right)\left(V_B\right)_{AT}-\left(V_{p0}+aV_{p1}+a^2V_{p2}\right)\left(V_B\right)_{BT}=0$
mc-pb	$I_{m0}-aI_{m1}=0 \quad I_{m0}-a^2 I_{m2}=0 \quad I_{p0}-a^2 I_{p1}=0 \quad I_{p0}-aI_{p2}=0$ $I_{m0}\left(I_B\right)_{AT}+I_{p0}\left(I_B\right)_{BT}=0$ $-6R_f I_{m0}\left(I_B\right)_{AT}+\left(V_{m0}+aV_{m1}+a^2V_{m2}\right)\left(V_B\right)_{AT}-\left(V_{p0}+a^2V_{p1}+aV_{p2}\right)\left(V_B\right)_{BT}=0$
ma-pa-g	$I_{m0}-I_{m1}=0 \quad I_{m0}-I_{m2}=0 \quad I_{p0}-I_{p1}=0 \quad I_{p0}-I_{p2}=0$ $-3\left(R_f+R_g\right)I_{m0}\left(I_B\right)_{AT}+\left(V_{m0}+V_{m1}+V_{m2}\right)\left(V_B\right)_{AT}-3R_g I_{p0}\left(I_B\right)_{BT}=0$ $-3R_g I_{m0}\left(I_B\right)_{AT}-3\left(R_f+R_g\right)I_{p0}\left(I_B\right)_{BT}+\left(V_{p0}+V_{p1}+V_{p2}\right)\left(V_B\right)_{BT}=0$
mb-pc-g	$I_{m0}-a^2 I_{m1}=0 \quad I_{m0}-aI_{m2}=0 \quad I_{p0}-aI_{p1}=0 \quad I_{p0}-a^2 I_{p2}=0$ $-3\left(R_f+R_g\right)I_{m0}\left(I_B\right)_{AT}+\left(V_{m0}+a^2V_{m1}+aV_{m2}\right)\left(V_B\right)_{AT}-3R_g I_{p0}\left(I_B\right)_{BT}=0$ $-3R_g I_{m0}\left(I_B\right)_{AT}-3\left(R_f+R_g\right)I_{p0}\left(I_B\right)_{BT}+\left(V_{p0}+aV_{p1}+a^2V_{p2}\right)\left(V_B\right)_{BT}=0$
mc-pb-g	$I_{m0}-aI_{m1}=0 \quad I_{m0}-a^2 I_{m2}=0 \quad I_{p0}-a^2 I_{p1}=0 \quad I_{p0}-aI_{p2}=0$ $-3\left(R_f+R_g\right)I_{m0}\left(I_B\right)_{AT}+\left(V_{m0}+aV_{m1}+a^2V_{m2}\right)\left(V_B\right)_{AT}-3R_g I_{p0}\left(I_B\right)_{BT}=0$ $-3R_g I_{m0}\left(I_B\right)_{AT}-3\left(R_f+R_g\right)I_{p0}\left(I_B\right)_{BT}+\left(V_{p0}+a^2V_{p1}+aV_{p2}\right)\left(V_B\right)_{BT}=0$
ma-pa-pb	$I_{m0}-I_{m1}=0 \quad I_{m0}-I_{m2}=0 \quad I_{p0}+aI_{p1}+a^2 I_{p2}=0$ $I_{m0}\left(I_B\right)_{AT}+I_{p0}\left(I_B\right)_{BT}=0$ $-4R_f I_{m0}\left(I_B\right)_{AT}+\left(V_{m0}+V_{m1}+V_{m2}\right)\left(V_B\right)_{AT}+\left(R_f I_{p1}+R_f I_{p2}\right)\left(I_B\right)_{BT}-$ $-\left(V_{p0}+V_{p1}+V_{p2}\right)\left(V_B\right)_{BT}=0$ $-4R_f I_{m0}\left(I_B\right)_{AT}+\left(V_{m0}+V_{m1}+V_{m2}\right)\left(V_B\right)_{AT}+\left(R_f a^2 I_{p1}+R_f aI_{p2}\right)\left(I_B\right)_{BT}-$ $-\left(V_{p0}+a^2V_{p1}+aV_{p2}\right)\left(V_B\right)_{BT}=0$

Tabla 3.5.4, Parte 2	
Falta	Falta Intercircuito entre Líneas de Diferente Tensión (continuación) Condiciones Locales de Falta en m,p con m=p Componentes Simétricas (Valores en pu)
mb-pa-pc	$I_{m0}-a^2I_{m1}=0 \quad I_{m0}-aI_{m2}=0 \quad I_{p0}+a^2I_{p1}+aI_{p2}=0$ $I_{m0}\left(I_B\right)_{AT}+I_{p0}\left(I_B\right)_{BT}=0$ $-4R_fI_{m0}\left(I_B\right)_{AT}+\left(V_{m0}+a^2V_{m1}+aV_{m2}\right)\left(V_B\right)_{AT}+\left(R_fI_{p1}+R_fI_{p2}\right)\left(I_B\right)_{BT}-$ $-\left(V_{p0}+V_{p1}+V_{p2}\right)\left(V_B\right)_{BT}=0$ $-4R_fI_{m0}\left(I_B\right)_{AT}+\left(V_{m0}+a^2V_{m1}+aV_{m2}\right)\left(V_B\right)_{AT}+\left(R_faI_{p1}+R_fa^2I_{p2}\right)\left(I_B\right)_{BT}-$ $-\left(V_{p0}+aV_{p1}+a^2V_{p2}\right)\left(V_B\right)_{BT}=0$
mc-pb-pc	$I_{m0}-aI_{m1}=0 \quad I_{m0}-a^2I_{m2}=0 \quad I_{p0}+I_{p1}+I_{p2}=0$ $I_{m0}\left(I_B\right)_{AT}+I_{p0}\left(I_B\right)_{BT}=0$ $-4R_fI_{m0}\left(I_B\right)_{AT}+\left(V_{m0}+aV_{m1}+a^2V_{m2}\right)\left(V_B\right)_{AT}+\left(R_fa^2I_{p1}+R_faI_{p2}\right)\left(I_B\right)_{BT}-$ $-\left(V_{p0}+a^2V_{p1}+aV_{p2}\right)\left(V_B\right)_{BT}=0$ $-4R_fI_{m0}\left(I_B\right)_{AT}+\left(V_{m0}+aV_{m1}+a^2V_{m2}\right)\left(V_B\right)_{AT}+\left(R_faI_{p1}+R_fa^2I_{p2}\right)\left(I_B\right)_{BT}-$ $-\left(V_{p0}+aV_{p1}+a^2V_{p2}\right)\left(V_B\right)_{BT}=0$

Tabla 3.5.4, Parte 3	
Falta	Falta Intercircuito entre Líneas de Diferente Tensión (Continuación) Condiciones Locales de Falta en m,p con m=p Componentes Simétricas (Valores en pu)
ma-pa-pb-g	$I_{m0}-I_{m1}=0 \quad I_{m0}-I_{m2}=0 \quad I_{p0}+aI_{p1}+a^2I_{p2}=0$ $-3\left(R_f+R_g\right)I_{m0}\left(I_B\right)_{AT}+\left(V_{m0}+V_{m1}+V_{m2}\right)\left(V_B\right)_{AT}-3R_gI_{p0}I_{m0}\left(I_B\right)_{BT}=0$ $-3R_fI_{m0}\left(I_B\right)_{AT}+\left(V_{m0}+V_{m1}+V_{m2}\right)\left(V_B\right)_{AT}+\left(R_f\left(1-a\right)I_{p0}+R_f\left(1-a^2\right)I_{p1}\right)\left(I_B\right)_{BT}-$ $-\left(V_{p0}+V_{p1}+V_{p2}\right)\left(V_B\right)_{BT}=0$ $-3R_fI_{m0}\left(I_B\right)_{AT}+\left(V_{m0}+V_{m1}+V_{m2}\right)\left(V_B\right)_{AT}+\left(R_f\left(1-a^2\right)I_{p0}-R_f\left(1-a^2\right)I_{p1}\right)\left(I_B\right)_{BT}-$ $-\left(V_{p0}+a^2V_{p1}+aV_{p2}\right)\left(V_B\right)_{BT}=0$
mb-pa-pc-g	$I_{m0}-a^2I_{m1}=0 \quad I_{m0}-aI_{m2}=0 \quad I_{p0}+a^2I_{p1}+aI_{p2}=0$ $-3\left(R_f+R_g\right)I_{m0}\left(I_B\right)_{AT}+\left(V_{m0}+a^2V_{m1}+aV_{m2}\right)\left(V_B\right)_{AT}-3R_gI_{p0}\left(I_B\right)_{BT}=0$ $-3R_gI_{m0}\left(I_B\right)_{AT}-\left[\left(R_f\left(1-a^2\right)+3R_g\right)I_{p0}+R_f\left(1-a\right)I_{p1}\right]\left(I_B\right)_{BT}+$ $+\left(V_{p0}+V_{p1}+V_{p2}\right)\left(V_B\right)_{BT}=0$ $-3R_gI_{m0}\left(I_B\right)_{AT}-\left[\left(R_f\left(1-a\right)+3R_g\right)I_{p0}+R_f\left(a-1\right)I_{p1}\right]\left(I_B\right)_{BT}+$ $+\left(V_{p0}+aV_{p1}+a^2V_{p2}\right)\left(V_B\right)_{BT}=0$
mc-pb-pc-g	$I_{m0}-aI_{m1}=0 \quad I_{m0}-a^2I_{m2}=0 \quad I_{p0}+I_{p1}+I_{p2}=0$ $-3\left(R_f+R_g\right)I_{m0}\left(I_B\right)_{AT}+\left(V_{m0}+aV_{m1}+a^2V_{m2}\right)\left(V_B\right)_{AT}-3R_gI_{p0}\left(I_B\right)_{BT}=0$ $-3R_gI_{m0}\left(I_B\right)_{AT}-\left[\left(R_f\left(1-a\right)+3R_g\right)I_{p0}+R_f\left(a^2-a\right)I_{p1}\right]\left(I_B\right)_{BT}+$ $+\left(V_{p0}+a^2V_{p1}+aV_{p2}\right)\left(V_B\right)_{BT}=0$ $-3R_gI_{m0}\left(I_B\right)_{AT}-\left[\left(R_f\left(1-a^2\right)+3R_g\right)I_{p0}+R_f\left(a-a^2\right)I_{p1}\right]\left(I_B\right)_{BT}+$ $+\left(V_{p0}+aV_{p1}+a^2V_{p2}\right)\left(V_B\right)_{BT}=0$

Tabla 3.5.4, Parte 4	
Falta	Falta Intercircuito entre Líneas de Diferente Tensión(Continuación) Condiciones Locales de Falta en m,p con m=p Componentes Simétricas (Valores en pu)
ma- pa- pb- pc	$I_{m0}-I_{m1}=0 \quad I_{m0}-I_{m2}=0 \quad I_{m0}+I_{p0}=0$ $-4R_f I_{m0}\left(I_B\right)_{AT}+\left(V_{m0}+V_{m1}+V_{m2}\right)\left(V_B\right)_{AT}-V_{p0}\left(V_B\right)_{BT}=0$ $-R_f I_{p1}\left(I_B\right)_{BT}+V_{p1}\left(V_B\right)_{BT}=0$ $-R_f I_{p2}\left(I_B\right)_{BT}+V_{p2}\left(V_B\right)_{BT}=0$
ma- pa- pb- pc-g	$I_{m0}-I_{m1}=0 \quad I_{m0}-I_{m2}=0$ $-3\left(R_f+R_g\right)I_{m0}\left(I_B\right)_{AT}+\left(V_{m0}+V_{m1}+V_{m2}\right)\left(V_B\right)_{AT}-3R_g I_{p0}\left(I_B\right)_{BT}=0$ $-3R_g I_{m0}\left(I_B\right)_{AT}-\left(R_f+3R_g\right)I_{p0}\left(I_B\right)_{BT}+V_{p0}\left(V_B\right)_{BT}=0$ $-R_f I_{p1}\left(I_B\right)_{BT}+V_{p1}\left(V_B\right)_{BT}=0$ $-R_f I_{p2}\left(I_B\right)_{BT}+V_{p2}\left(V_B\right)_{BT}=0$

Tabla 3.5.4, Parte 5	
Falta	Falta Intercircuito entre Líneas de Diferente Tensión (Continuación) Condiciones Locales de Falta en m,p con m=p Componentes Simétricas (Valores en pu)
ma-mb-pa-pb	$I_{m0}+aI_{m1}+a^2I_{m2}=0 \qquad I_{p0}+aI_{p1}+a^2I_{p2}=0 \qquad I_{m0}(I_B)_{AT}+I_{p0}(I_B)_{BT}=0$ $(-a^2R_fI_{m1}+R_fI_{m2})(I_B)_{AT}+(a^2V_{m1}-V_{m2})(V_B)_{AT}=0$ $(-2R_fI_{m0}-R_fI_{m1}-R_fI_{m2})(I_B)_{AT}+(V_{m0}+V_{m1}+V_{m2})(V_B)_{AT}+$ $+(R_fI_{p1}+R_fI_{p2})(I_B)_{BT}-(V_{p0}+V_{p1}+V_{p2})(V_B)_{BT}=0$ $(-2R_fI_{m0}-R_fI_{m1}-R_fI_{m2})(I_B)_{AT}+(V_{m0}+V_{m1}+V_{m2})(V_B)_{AT}+$ $+(a^2R_fI_{p1}+aR_fI_{p2})(I_B)_{BT}-(V_{p0}+a^2V_{p1}+aV_{p2})(V_B)_{BT}=0$
ma-mb-pb-pc	$I_{m0}+aI_{m1}+a^2I_{m2}=0 \qquad I_{p0}+I_{p1}+I_{p2}=0 \qquad I_{m0}(I_B)_{AT}+I_{p0}(I_B)_{BT}=0$ $(-a^2R_fI_{m1}+R_fI_{m2})(I_B)_{AT}+(a^2V_{m1}-V_{m2})(V_B)_{AT}=0$ $(-2R_fI_{m0}-R_fI_{m1}-R_fI_{m2})(I_B)_{AT}+(V_{m0}+V_{m1}+V_{m2})(V_B)_{AT}+$ $+(R_fa^2I_{p1}+R_faI_{p2})(I_B)_{BT}-(V_{p0}+a^2V_{p1}+aV_{p2})(V_B)_{BT}=0$ $(-2R_fI_{m0}-R_fI_{m1}-R_fI_{m2})(I_B)_{AT}+(V_{m0}+V_{m1}+V_{m2})(V_B)_{AT}+$ $+(aR_fI_{p1}+a^2R_fI_{p2})(I_B)_{BT}-(V_{p0}+aV_{p1}+a^2V_{p2})(V_B)_{BT}=0$
ma-mb-pc-pa	$I_{m0}+aI_{m1}+a^2I_{m2}=0 \qquad I_{p0}+a^2I_{p1}+aI_{p2}=0 \qquad I_{m0}(I_B)_{AT}+I_{p0}(I_B)_{BT}=0$ $(-a^2R_fI_{m1}+R_fI_{m2})(I_B)_{AT}+(a^2V_{m1}-V_{m2})(V_B)_{AT}=0$ $(-3R_fI_{m0}-(1-a^2)R_fI_{m1})(I_B)_{AT}+(V_{m0}+V_{m1}+V_{m2})(V_B)_{AT}-$ $-(a-1)R_fI_{p1}(I_B)_{BT}-(V_{p0}+V_{p1}+V_{p2})(V_B)_{BT}=0$ $[-2(1-a)R_fI_{m0}-(1-a^2)R_fI_{m1}](I_B)_{AT}+(V_{m0}+V_{m1}+V_{m2})(V_B)_{AT}-$ $-(1-a)R_fI_{p1}(I_B)_{BT}-(V_{p0}+aV_{p1}+a^2V_{p2})(V_B)_{BT}=0$
ma-mb-pa-pb-g	$I_{m0}+aI_{m1}+a^2I_{m2}=0 \qquad I_{p0}+aI_{p1}+a^2I_{p2}=0$ $-[(R_f+3R_g)I_{m0}+R_fI_{m1}+R_fI_{m2}](I_B)_{AT}+(V_{m0}+V_{m1}+V_{m2})(V_B)_{AT}-3R_gI_{p0}(I_B)_{BT}=0$ $-[(R_f+3R_g)I_{m0}+R_fa^2I_{m1}+R_faI_{m2}](I_B)_{AT}+(V_{m0}+a^2V_{m1}+aV_{m2})(V_B)_{AT}-$ $-3R_gI_{p0}(I_B)_{BT}=0$ $-3R_gI_{m0}(I_B)_{AT}-[(R_f+3R_g)I_{p0}+R_fI_{p1}+R_fI_{p2}](I_B)_{BT}+$ $+(V_{p0}+V_{p1}+V_{p2})(V_B)_{BT}=0$ $-3R_gI_{m0}(I_B)_{AT}-[(R_f+3R_g)I_{p0}+R_fa^2I_{p1}+R_faI_{p2}](I_B)_{BT}+$ $+(V_{p0}+a^2V_{p1}+aV_{p2})(V_B)_{BT}=0$

Tabla 3.5.4, Parte 6	
Falta	Falta Intercircuito entre Líneas de Diferente Tensión (Continuación) Condiciones Locales de Falta en m,p con m=p Componentes Simétricas (Valores en pu)
ma-mb-pb-pc-g	$I_{m0}+aI_{m1}+a^2I_{m2}=0 \qquad I_{p0}+I_{p1}+I_{p2}=0$ $-\left[\left(R_f\left(1-a\right)+3R_g\right)I_{m0}+R_f\left(1-a^2\right)I_{m1}\right]\left(I_B\right)_{AT}+\left(V_{m0}+V_{m1}+V_{m2}\right)\left(V_B\right)_{AT}-$ $-3R_gI_{p0}\left(I_B\right)_{BT}=0$ $-\left[\left(R_f\left(1-a^2\right)+3R_g\right)I_{m0}+R_f\left(a^2-1\right)I_{m1}\right]\left(I_B\right)_{AT}+\left(V_{m0}+a^2V_{m1}+aV_{m2}\right)\left(V_B\right)_{AT}-$ $-3R_gI_{p0}\left(I_B\right)_{BT}=0$ $-\left[3R_gI_{m0}-\left(R_f\left(1-a\right)+3R_g\right)I_{p0}\right]\left(I_B\right)_{AT}-a\left(a-1\right)R_fI_{p1}\left(I_B\right)_{BT}+$ $+\left(V_{p0}+a^2V_{p1}+aV_{p2}\right)\left(V_B\right)_{BT}=0$ $-\left[3R_gI_{m0}-\left(R_f\left(1-a^2\right)+3R_g\right)I_{p0}\right]\left(I_B\right)_{AT}+a\left(a-1\right)R_fI_{p1}\left(I_B\right)_{BT}+$ $+\left(V_{p0}+aV_{p1}+a^2V_{p2}\right)\left(V_B\right)_{BT}=0$
ma-mb-pc-pa-g	$I_{m0}+aI_{m1}+a^2I_{m2}=0 \qquad I_{p0}+a^2I_{p1}+aI_{p2}=0$ $-\left[\left(R_f\left(1-a\right)+3R_g\right)I_{m0}+R_f\left(1-a^2\right)I_{m1}\right]\left(I_B\right)_{AT}+\left(V_{m0}+V_{m1}+V_{m2}\right)\left(V_B\right)_{AT}-$ $-3R_gI_{p0}\left(I_B\right)_{BT}=0$ $-\left[\left(R_f\left(1-a^2\right)+3R_g\right)I_{m0}+R_f\left(a^2-1\right)I_{m1}\right]+\left(V_{m0}+a^2V_{m1}+aV_{m2}\right)\left(V_B\right)_{AT}-$ $-3R_gI_{p0}\left(I_B\right)_{BT}=0$ $-\left[3R_gI_{m0}+\left(R_f\left(1-a^2\right)+3R_g\right)I_{p0}+\left(1-a\right)R_fI_{p1}\right]\left(I_B\right)_{BT}+\left(V_{p0}+V_{p1}+V_{p2}\right)\left(V_B\right)_{BT}=0$ $-3R_gI_{m0}\left(I_B\right)_{AT}-\left[\left(R_f\left(1-a\right)+3R_g\right)I_{p0}+\left(a-1\right)R_fI_{p1}\right]\left(I_B\right)_{BT}+$ $+\left(V_{p0}+aV_{p1}+a^2V_{p2}\right)\left(V_B\right)_{BT}=0$

Tabla 3.5.4, Parte 7	
Falta	Falta Intercircuito entre Líneas de Diferente Tensión (Continuación) Condiciones Locales de Falta en m,p con m=p Componentes Simétricas (Valores en pu)
ma-mb-mc-pa-pb-pc	$I_{m0}\left(I_B\right)_{AT}+I_{p0}\left(I_B\right)_{BT}=0$ $-2R_f I_{m0}\left(I_B\right)_{AT}+V_{m0}\left(V_B\right)_{AT}-V_{p0}\left(V_B\right)_{BT}=0$ $-R_f I_{m1}\left(I_B\right)_{AT}+V_{m1}\left(V_B\right)_{AT}=0$ $\quad -R_f I_{m2}\left(I_B\right)_{AT}+V_{m2}\left(V_B\right)_{AT}=0$ $-R_f I_{p1}\left(I_B\right)_{BT}+V_{p1}\left(V_B\right)_{BT}=0$ $\quad -R_f I_{p2}\left(I_B\right)_{BT}+V_{p2}\left(V_B\right)_{BT}=0$
ma-mb-mc-pa-pb-pc-g	$-\left(R_f+3R_g\right)I_{m0}\left(I_B\right)_{AT}+V_{m0}\left(V_B\right)_{AT}-3R_g I_{p0}\left(I_B\right)_{BT}=0$ $-R_f I_{m1}\left(I_B\right)_{AT}+V_{m1}\left(V_B\right)_{AT}=0$ $\quad -R_f I_{m2}\left(I_B\right)_{AT}+V_{m2}\left(V_B\right)_{AT}=0$ $-3R_g I_{m0}\left(I_B\right)_{AT}-\left(R_f+3R_g\right)I_{p0}\left(I_B\right)_{BT}+V_{p0}\left(V_B\right)_{BT}=0$ $-R_f I_{p1}\left(I_B\right)_{BT}+V_{p1}\left(V_B\right)_{BT}=0$ $\quad -R_f I_{p2}\left(I_B\right)_{BT}+V_{p2}\left(V_B\right)_{BT}=0$

3.5.5 Falta Triple

La Falta Triple está representada en la Figura 3.3.n
Las Ecuaciones Locales de Falta en q son similares a las Ecuaciones Locales de falta en m y p expuestas anteriormente. No reflejaremos, por tanto, estas Ecuaciones para la Falta en m y p, remitiéndonos a lo anterior. Si lo haremos para la Falta en q, pues aunque son similares cambia la nomenclatura al pasar m ó p a q.
Las Faltas ag, bg, cg están representadas en la Figura 3.3.b
Las Faltas bc, ca, ab están representadas en la Figura 3.3.c
Las Faltas bcg, cag, abg están representadas en la Figura 3.3.d
La Falta abc está representada en la Figura 3.3.e
La Falta abcg está representada en la Figura 3.3.f

Tabla 3.5.5

Falta	Condiciones Locales de Falta en q: Componentes Simétricas
ag	$I_{q0}-I_{q1}=0 \qquad I_{q0}-I_{q2}=0$ $-3R_{fq}I_{q0}+V_{q0}+V_{q1}+V_{q2}=0$
bg	$I_{q0}-a^2I_{q1}=0 \qquad I_{q0}-aI_{q2}=0$ $-R_{fq}\left(I_{q0}+a^2I_{q1}+aI_{q2}\right)+V_{q0}+a^2V_{q1}+aV_{q2}=0$
cg	$I_{q0}-aI_{q1}=0 \qquad I_{q0}-a^2I_{q2}=0$ $-R_{fq}\left(I_{q0}+aI_{q1}+a^2I_{q2}\right)+V_{q0}+aV_{q1}+a^2V_{q2}=0$
ab	$I_{q0}=0 \qquad I_{q1}+aI_{q2}=0$ $-R_{fq}\left(I_{q1}-aI_{q2}\right)+V_{q1}-aV_{q2}=0$
bc	$I_{q0}=0 \qquad I_{q1}+I_{q2}=0$ $-R_{fq}\left(I_{q1}-I_{q2}\right)+V_{q1}-V_{q2}=0$
ca	$I_{q0}=0 \qquad I_{q1}+a^2I_{q2}=0$ $-R_{fq}\left(I_{q1}-a^2I_{q2}\right)+V_{q1}-a^2V_{q2}=0$
abg	$I_{q0}+aI_{q1}+a^2I_{q2}=0 \qquad -R_{fq}\left(a^2I_{q1}-I_{q2}\right)+a^2V_{q1}-V_{q2}=0$ $-\left(R_{fq}+3R_{gq}\right)I_{q0}-R_{fq}I_{q1}-R_{fq}I_{q2}+V_{q0}+V_{q1}+V_{q2}=0$
bcg	$I_{q0}+I_{q1}+I_{q2}=0 \qquad -R_{fq}\left(I_{q1}-I_{q2}\right)+V_{q1}-V_{q2}=0$ $-\left(R_{fq}+3R_{gq}\right)I_{q0}-a^2R_{fq}I_{q1}-aR_{fq}I_{q2}+V_{q0}+a^2V_{q1}+aV_{q2}=0$
cag	$I_{q0}+a^2I_{q1}+aI_{q2}=0 \qquad -R_{fq}\left(I_{q1}-a^2I_{q2}\right)+V_{q1}-a^2V_{q2}=0$ $-\left(R_{fq}+3R_{gq}\right)I_{q0}-aR_{fq}I_{q1}-a^2R_{fq}I_{q2}+V_{q0}+aV_{q1}+a^2V_{q2}=0$
abc	$I_{q0}=0 \qquad V_{q0}=0$ $-R_{fq}\left(I_{q1}+I_{q2}\right)+V_{q1}+V_{q2}=0$
abcg	$-\left(R_{fq}+3R_{gq}\right)I_{q0}+V_{q0}=0 \qquad -R_{fq}\left(I_{q1}+I_{q2}\right)+V_{q1}+V_{q2}=0$ $-R_{fq}\left(aI_{q1}+I_{q2}\right)+aV_{q1}+V_{q2}=0$