

1 Scenario 1

$$P1^* = \frac{\eta(r_H + t_H)}{V_{HP}\omega} \quad (1)$$

$$M1^* = \frac{\omega M1_{NUM} + \eta^2 l \mu^2 t_H t_P V_{FD} V_{FM}^2 V_{PN}(r_H + t_H)}{\mu V_{FM} V_{HP} \omega M1_{DEN}} \quad (2)$$

$$D1^* = \frac{\omega D1_{NUM} + \eta \mu q t_P V_{FM}(r_H + t_H)(l \mu V_{FM} + r_F V_{MD} \phi + \mu(-r_M) V_{FD})}{\omega D1_{DEN}} \quad (3)$$

$$\delta 1^* = \frac{\mu \delta 1_{NUM}}{V_{HP} \omega \delta 1_{DEN} + \eta \mu q t_P V_{FM} V_{HP}(r_H + t_H)(l \mu V_{FM} + r_F V_{MD} \phi + \mu(-r_M) V_{FD})} \quad (4)$$

$$N1^* = \frac{\omega N1_{NUM} - \eta l \mu t_P V_{FM}(r_H + t_H)(l \mu V_{FM} + r_F V_{MD} \phi + \mu(-r_M) V_{FD})}{\omega(l^2 \mu^2 V_{FM}^2(q V_{HP} + t_H V_{PN}) + l \mu V_{FM}(q V_{HP}(V_{MD} \phi(2r_F + t_F) + \mu V_{FD}(-2r_M - t_M)) + t_H V_{PN}(r_F V_{MD} \phi - \mu r_M V_{FD} + \eta t_F V_{MD} + \eta(-t_M) V_{FD})) + q V_{HP}(\mu r_M V_{FD} - r_F V_{MD} \phi)(\mu V_{FD}(r_M + t_M) - V_{MD} \phi(r_F + t_F)))} \quad (5)$$

$$H1^* = \frac{\omega H1_{NUM} - \eta l \mu t_P V_{FM} V_{PN}(r_H + t_H)(l \mu V_{FM} + r_F V_{MD} \phi + \mu(-r_M) V_{FD})}{V_{HP} \omega(l^2 \mu^2 V_{FM}^2(q V_{HP} + t_H V_{PN}) + l \mu V_{FM}(q V_{HP}(V_{MD} \phi(2r_F + t_F) + \mu V_{FD}(-2r_M - t_M)) + t_H V_{PN}(r_F V_{MD} \phi - \mu r_M V_{FD} + \eta t_F V_{MD} + \eta(-t_M) V_{FD})) + q V_{HP}(\mu r_M V_{FD} - r_F V_{MD} \phi)(\mu V_{FD}(r_M + t_M) - V_{MD} \phi(r_F + t_F)))} \quad (6)$$

$$F1^* = \frac{\eta^2(-l) \mu t_H t_P V_{FM}^2 V_{MD} V_{PN}(r_H + t_H) - \omega(q V_{HP}(\mu(V_{FD}(r_M + t_M) - l V_{FM}) - V_{MD} \phi(r_F + t_F))(\mu V_{HP}(r_M + t_M)(r_M V_{FD} - l V_{FM}) - r_M V_{HP} V_{MD} \phi(r_F + t_F) + \eta r_H t_P V_{FM} V_{MD}) - t_H V_{FM} V_{PN}(V_{HP} V_{MD} \phi(r_F + t_F)(\eta I_N V_{MD} - l(\mu r_M + \eta t_M)) + \mu(\eta(l V_{FM} V_{MD}(I_N V_{HP} + t_P(r_H + t_H)) - I_N V_{FD} V_{HP} V_{MD}(r_M + t_M) + l t_M V_{FD} V_{HP}(r_M + t_M)) + l \mu V_{HP}(r_M + t_M)(r_M V_{FD} - l V_{FM}))))}{V_{FM} V_{HP} \omega(l^2 \mu^2 V_{FM}^2(q V_{HP} + t_H V_{PN}) + l \mu V_{FM}(q V_{HP}(V_{MD} \phi(2r_F + t_F) + \mu V_{FD}(-2r_M - t_M)) + t_H V_{PN}(r_F V_{MD} \phi - \mu r_M V_{FD} + \eta t_F V_{MD} + \eta(-t_M) V_{FD})) + q V_{HP}(\mu r_M V_{FD} - r_F V_{MD} \phi)(\mu V_{FD}(r_M + t_M) - V_{MD} \phi(r_F + t_F)))} \quad (7)$$

$$(8)$$

2 Scenario 2

$$P2^* = \frac{qV_{HP}(ex_F ex_M V_{FD} + ex_F l V_{FM} + ex_F V_{MD}(ex_F + t_F) - ex_F t_M V_{FD} + lt_F V_{FM}) + t_H V_{FM} V_{PN}(l(ex_F + t_F) - I_N V_{FD}) - ex_H q t_P V_{FD} V_{FM}}{V_{FM}(qV_{HP}(ex_F V_{MD} + ex_M V_{FD} + l V_{FM}) + lt_H V_{FM} V_{PN})} \quad (9)$$

$$M2^* = \frac{qV_{HP}(ex_F ex_M V_{FD} + ex_F l V_{FM} + ex_F V_{MD}(ex_F + t_F) - ex_F t_M V_{FD} + lt_F V_{FM}) + t_H V_{FM} V_{PN}(l(ex_F + t_F) - I_N V_{FD}) - ex_H q t_P V_{FD} V_{FM}}{V_{FM}(qV_{HP}(ex_F V_{MD} + ex_M V_{FD} + l V_{FM}) + lt_H V_{FM} V_{PN})} \quad (10)$$

$$D2^* = \frac{ex_F q t_M V_{HP} + ex_H q t_P V_{FM} + ex_M q t_F V_{HP} + I_N t_H V_{FM} V_{PN}}{qV_{HP}(ex_F V_{MD} + ex_M V_{FD} + l V_{FM}) + lt_H V_{FM} V_{PN}} \quad (11)$$

$$\delta 2^* = \frac{V_{HP}(ex_F^2 \mu q t_M V_{HP} V_{MD} + ex_F(q(t_P V_{FM} V_{MD} \omega(ex_H + t_H) + \mu t_F t_M V_{HP} V_{MD} - \eta t_H t_P V_{FM} V_{MD} + \mu t_M^2(-V_{FD})V_{HP}) + \eta I_N t_H V_{FM} V_{MD} V_{PN}) + V_{FM}(ex_H q t_P + I_N t_H V_{PN})(t_F V_{MD} \phi - \mu t_M V_{FD})) + \delta 2_{NUM}}{V_{HP}(V_{MD}(ex_F + t_F) + ex_M V_{FD} + l V_{FM} - t_M V_{FD})(ex_F q t_M V_{HP} + ex_H q t_P V_{FM} + ex_M q t_F V_{HP} + I_N t_H V_{FM} V_{PN})} \quad (12)$$

$$N2^* = \frac{V_{HP}(ex_F I_N V_{MD} - ex_F l t_M + ex_M I_N V_{FD} - ex_M l t_F + I_N l V_{FM}) - ex_H l t_P V_{FM}}{qV_{HP}(ex_F V_{MD} + ex_M V_{FD} + l V_{FM}) + lt_H V_{FM} V_{PN}} \quad (13)$$

$$H2^* = - \frac{V_{PN}(l(ex_F t_M V_{HP} + ex_M t_F V_{HP} - I_N V_{FM} V_{HP} + t_H t_P V_{FM}) - I_N V_{HP}(ex_F V_{MD} + ex_M V_{FD}) + ex_H l t_P V_{FM}) + q t_P V_{HP}(ex_F V_{MD} + ex_M V_{FD} + l V_{FM})}{V_{HP}(qV_{HP}(ex_F V_{MD} + ex_M V_{FD} + l V_{FM}) + lt_H V_{FM} V_{PN})} \quad (14)$$

$$F2^* = \frac{qV_{MD}(ex_M V_{HP}(ex_F + t_F) + ex_H t_P V_{FM}) + t_H V_{FM} V_{PN}(ex_M l + I_N V_{MD} - lt_M) + qV_{HP}(ex_M - t_M)(ex_M V_{FD} + l V_{FM})}{V_{FM}(qV_{HP}(ex_F V_{MD} + ex_M V_{FD} + l V_{FM}) + lt_H V_{FM} V_{PN})} \quad (15)$$

$$(16)$$

3 Scenario 3

$$P3^* = \frac{\eta(r_H + t_H)}{V_{HP}\omega} \quad (17)$$

$$M3^* = \frac{q\omega(V_{HP}(ex_F ex_M V_{FD} + ex_F l V_{FM} + ex_F V_{MD}(ex_F + t_F) - ex_F t_M V_{FD} + lt_F V_{FM}) + t_H t_P V_{FD} V_{FM}) + t_H V_{FM} V_{PN} \omega(l(ex_F + t_F) - I_N V_{FD}) + \eta(-q)t_P V_{FD} V_{FM}(r_H + t_H)}{V_{FM}\omega(qV_{HP}(ex_F V_{MD} + ex_M V_{FD} + l V_{FM}) + lt_H V_{FM} V_{PN})} \quad (18)$$

$$D3^* = \frac{\omega(q(ex_F t_M V_{HP} + ex_M t_F V_{HP} - t_H t_P V_{FM}) + I_N t_H V_{FM} V_{PN}) + \eta q t_P V_{FM}(r_H + t_H)}{\omega(qV_{HP}(ex_F V_{MD} + ex_M V_{FD} + l V_{FM}) + lt_H V_{FM} V_{PN})} \quad (19)$$

$$\delta 3^* = \frac{l V_{FM}(\omega(t_H V_{PN}(V_{HP}(ex_F t_M(\mu - \eta) + ex_M t_F(\phi - \eta) + \eta I_N V_{FM} + t_F t_M(\mu - \phi)) + \eta r_H t_P V_{FM} + \eta t_H t_P V_{FM})) + q V_{HP}(\mu t_M V_{HP}(ex_F + t_F) + t_F V_{HP} \phi(ex_M - t_M) + \eta r_H t_P V_{FM})) - \eta^2 t_H t_P V_{FM} V_{PN}(r_H + t_H)) + \delta 3_{NUM}}{V_{HP}(V_{MD}(ex_F + t_F) + ex_M V_{FD} + l V_{FM} - t_M V_{FD})(\omega(q(ex_F t_M V_{HP} + ex_M t_F V_{HP} - t_H t_P V_{FM}) + I_N t_H V_{FM} V_{PN}) + \eta q t_P V_{FM}(r_H + t_H))} \quad (20)$$

$$N3^* = \frac{l\omega(t_H t_P V_{FM} - V_{HP}(ex_F t_M + ex_M t_F - I_N V_{FM})) + I_N V_{HP} \omega(ex_F V_{MD} + ex_M V_{FD}) + \eta(-l)t_P V_{FM}(r_H + t_H)}{\omega(qV_{HP}(ex_F V_{MD} + ex_M V_{FD} + l V_{FM}) + lt_H V_{FM} V_{PN})} \quad (21)$$

$$H3^* = - \frac{l V_{HP} \omega(V_{PN}(ex_F t_M + ex_M t_F - I_N V_{FM}) + q t_P V_{FM}) + V_{HP} \omega(ex_F V_{MD} + ex_M V_{FD})(q t_P - I_N V_{PN}) + \eta l t_P V_{FM} V_{PN}(r_H + t_H)}{V_{HP} \omega(q V_{HP}(ex_F V_{MD} + ex_M V_{FD} + l V_{FM}) + lt_H V_{FM} V_{PN})} \quad (22)$$

$$F3^* = \frac{q\omega(V_{MD}(ex_M V_{HP}(ex_F + t_F) - t_H t_P V_{FM}) + V_{HP}(ex_M - t_M)(ex_M V_{FD} + l V_{FM})) + t_H V_{FM} V_{PN} \omega(ex_M l + I_N V_{MD} - lt_M) + \eta q t_P V_{FM} V_{MD}(r_H + t_H)}{V_{FM} \omega(q V_{HP}(ex_F V_{MD} + ex_M V_{FD} + l V_{FM}) + lt_H V_{FM} V_{PN})} \quad (23)$$

$$(24)$$

4 Scenario 4

$$P4^* = \frac{ex_H + t_H}{V_{HP}} \quad (25)$$

$$M4^* = \frac{\mu t_H V_{FM} V_{PN} M4_{NUM} + q V_{HP} (\mu (V_{FD}(r_M + t_M) - l V_{FM}) - V_{MD} \phi(r_F + t_F)) (ex_H \mu t_P V_{FD} V_{FM} \omega + V_{HP} \phi(\mu (r_F V_{FD}(r_M + t_M) - l V_{FM}(r_F + t_F)) - r_F V_{MD} \phi(r_F + t_F)) + \mu t_H t_P V_{FD} V_{FM} (\omega - \eta))}{\mu V_{FM} V_{HP} (l^2 \mu^2 V_{FM}^2 (q V_{HP} + t_H V_{PN}) + l \mu V_{FM} (q V_{HP} (V_{MD} \phi(2r_F + t_F) + \mu V_{FD}(-2r_M - t_M)) + t_H V_{PN} (r_F V_{MD} \phi - \mu r_M V_{FD} + \eta t_F V_{MD} + \eta(-t_M) V_{FD})) + q V_{HP} (\mu r_M V_{FD} - r_F V_{MD} \phi) (\mu V_{FD}(r_M + t_M) - V_{MD} \phi(r_F + t_F)))} \quad (26)$$

$$D4^* = \frac{q(ex_H \mu t_P V_{FM} (l \mu V_{FM} + r_F V_{MD} \phi + \mu(-r_M) V_{FD} + t_F V_{MD} \omega - t_M V_{FD} \omega) + V_{HP} (-\mu \phi(-l t_M V_{FM}(r_F + t_F) + r_M t_F V_{MD}(r_F + t_F) + r_F t_M V_{FD}(r_M + t_M)) + \mu^2 t_F (r_M + t_M) (r_M V_{FD} - l V_{FM}) + r_F t_M V_{MD} \phi^2(r_F + t_F)) + \mu t_H t_P V_{FM} (\eta - \omega) (t_M V_{FD} - t_F V_{MD})) + I_N \mu t_H V_{FM} V_{PN} (l \mu V_{FM} + r_F V_{MD} \phi - \mu r_M V_{FD} + \eta t_F V_{MD} + \eta(-t_M) V_{FD})}{l^2 \mu^2 V_{FM}^2 (q V_{HP} + t_H V_{PN}) + l \mu V_{FM} (q V_{HP} (V_{MD} \phi(2r_F + t_F) + \mu V_{FD}(-2r_M - t_M)) + t_H V_{PN} (r_F V_{MD} \phi - \mu r_M V_{FD} + \eta t_F V_{MD} + \eta(-t_M) V_{FD})) + q V_{HP} (\mu r_M V_{FD} - r_F V_{MD} \phi) (\mu V_{FD}(r_M + t_M) - V_{MD} \phi(r_F + t_F))} \quad (27)$$

$$\delta 4^* = \frac{\mu (t_H V_{FM} V_{PN} (ex_H l \mu t_P V_{FM} (\omega - \eta) + l (\eta \mu V_{HP} (I_N V_{FM} + t_F (r_M + t_M))) - V_{HP} \phi(\eta r_F t_M - \mu r_F t_M + \mu r_M t_F + \eta t_F t_M) + \mu t_H t_P V_{FM} (\omega - \eta)) + \eta I_N V_{HP} (V_{MD} \phi(r_F + t_F) + \mu V_{FD}(-r_M - t_M))) + q V_{HP} (\mu (V_{FD}(r_M + t_M) - l V_{FM}) - V_{MD} \phi(r_F + t_F)) (-t_P V_{FM} \omega (ex_H + t_H) - r_F t_M V_{HP} \phi + r_M t_F V_{HP} \phi + \eta t_H t_P V_{FM}))}{V_{HP} (q(ex_H \mu t_P V_{FM} (l \mu V_{FM} + r_F V_{MD} \phi + \mu(-r_M) V_{FD} + t_F V_{MD} \omega - t_M V_{FD} \omega) + V_{HP} (-\mu \phi(-l t_M V_{FM}(r_F + t_F) + r_M t_F V_{MD}(r_F + t_F) + r_F t_M V_{FD}(r_M + t_M)) + \mu^2 t_F (r_M + t_M) (r_M V_{FD} - l V_{FM}) + r_F t_M V_{MD} \phi^2(r_F + t_F)) + \mu t_H t_P V_{FM} (\eta - \omega) (t_M V_{FD} - t_F V_{MD})) + I_N \mu t_H V_{FM} V_{PN} (l \mu V_{FM} + r_F V_{MD} \phi - \mu r_M V_{FD} + \eta t_F V_{MD} + \eta(-t_M) V_{FD}))} \quad (28)$$

$$N4^* = \frac{\mu l^2 V_{FM} (-ex_H \mu t_P V_{FM} + \mu V_{HP} (I_N V_{FM} + t_F (r_M + t_M)) - t_M V_{HP} \phi(r_F + t_F)) + l N4_{NUM} + I_N V_{HP} (\mu r_M V_{FD} - r_F V_{MD} \phi) (\mu V_{FD}(r_M + t_M) - V_{MD} \phi(r_F + t_F))}{l^2 \mu^2 V_{FM}^2 (q V_{HP} + t_H V_{PN}) + l \mu V_{FM} (q V_{HP} (V_{MD} \phi(2r_F + t_F) + \mu V_{FD}(-2r_M - t_M)) + t_H V_{PN} (r_F V_{MD} \phi - \mu r_M V_{FD} + \eta t_F V_{MD} + \eta(-t_M) V_{FD})) + q V_{HP} (\mu r_M V_{FD} - r_F V_{MD} \phi) (\mu V_{FD}(r_M + t_M) - V_{MD} \phi(r_F + t_F))} \quad (29)$$

$$H4^* = \frac{V_{PN} H4_{NUM} - q t_P V_{HP} (-l \mu V_{FM} - r_F V_{MD} \phi + \mu r_M V_{FD}) (\mu (V_{FD}(r_M + t_M) - l V_{FM}) - V_{MD} \phi(r_F + t_F))}{V_{HP} (l^2 \mu^2 V_{FM}^2 (q V_{HP} + t_H V_{PN}) + l \mu V_{FM} (q V_{HP} (V_{MD} \phi(2r_F + t_F) + \mu V_{FD}(-2r_M - t_M)) + t_H V_{PN} (r_F V_{MD} \phi - \mu r_M V_{FD} + \eta t_F V_{MD} + \eta(-t_M) V_{FD})) + q V_{HP} (\mu r_M V_{FD} - r_F V_{MD} \phi) (\mu V_{FD}(r_M + t_M) - V_{MD} \phi(r_F + t_F)))} \quad (30)$$

$$F4^* = \frac{-t_H V_{FM} V_{PN} F1_{NUM} - q V_{HP} (\mu (V_{FD}(r_M + t_M) - l V_{FM}) - V_{MD} \phi(r_F + t_F)) (ex_H t_P V_{FM} V_{MD} \omega + \mu V_{HP} (r_M + t_M) (r_M V_{FD} - l V_{FM}) - r_M V_{HP} V_{MD} \phi(r_F + t_F) + t_H t_P V_{FM} V_{MD} (\omega - \eta))}{V_{FM} V_{HP} (l^2 \mu^2 V_{FM}^2 (q V_{HP} + t_H V_{PN}) + l \mu V_{FM} (q V_{HP} (V_{MD} \phi(2r_F + t_F) + \mu V_{FD}(-2r_M - t_M)) + t_H V_{PN} (r_F V_{MD} \phi - \mu r_M V_{FD} + \eta t_F V_{MD} + \eta(-t_M) V_{FD})) + q V_{HP} (\mu r_M V_{FD} - r_F V_{MD} \phi) (\mu V_{FD}(r_M + t_M) - V_{MD} \phi(r_F + t_F)))} \quad (31)$$

$$(32)$$

5 Scenario I

$$M1b^* = \frac{\mu V_{FM}\chi(lr_F\phi - \theta I_N V_{FD}) + qr_F\phi(l\mu V_{FM} + r_F V_{MD}\phi + \mu(-r_M)V_{FD})}{\mu V_{FM}(q(l\mu V_{FM} + r_F V_{MD}\phi + \mu(-r_M)V_{FD}) + l\mu V_{FM}\chi)} \quad (33)$$

$$D1b^* = \frac{I_N \mu V_{FM}\chi}{q(l\mu V_{FM} + r_F V_{MD}\phi + \mu(-r_M)V_{FD}) + l\mu V_{FM}\chi} \quad (34)$$

$$\delta 1b = \theta \quad (35)$$

$$N1b^* = \frac{I_N(l\mu V_{FM} + r_F V_{MD}\phi + \mu(-r_M)V_{FD})}{q(l\mu V_{FM} + r_F V_{MD}\phi + \mu(-r_M)V_{FD}) + l\mu V_{FM}\chi} \quad (36)$$

$$F1b^* = \frac{V_{FM}\chi(\theta I_N V_{MD} - l\mu r_M) + qr_M(-l\mu V_{FM} - r_F V_{MD}\phi + \mu r_M V_{FD})}{V_{FM}(q(l\mu V_{FM} + r_F V_{MD}\phi + \mu(-r_M)V_{FD}) + l\mu V_{FM}\chi)} \quad (37)$$

$$(38)$$

6 Scenario II

$$M2b^* = \frac{ex_F q(ex_F V_{MD} + ex_M V_{FD} + lV_{FM}) + V_{FM}\chi(ex_F l - I_N V_{FD})}{V_{FM}(ex_F q V_{MD} + ex_M q V_{FD} + lV_{FM}(q + \chi))} \quad (39)$$

$$D2b^* = \frac{I_N V_{FM}\chi}{ex_F q V_{MD} + ex_M q V_{FD} + lV_{FM}(q + \chi)} \quad (40)$$

$$\delta 2b^* = \theta \quad (41)$$

$$N2b^* = \frac{I_N(ex_F V_{MD} + ex_M V_{FD} + lV_{FM})}{ex_F q V_{MD} + ex_M q V_{FD} + lV_{FM}(q + \chi)} \quad (42)$$

$$F2b^* = \frac{ex_M q(ex_F V_{MD} + ex_M V_{FD} + lV_{FM}) + V_{FM}\chi(ex_M l + I_N V_{MD})}{V_{FM}(ex_F q V_{MD} + ex_M q V_{FD} + lV_{FM}(q + \chi))} \quad (43)$$

$$(44)$$

7 Scenario III

$$M5^* = -\frac{\sqrt{\mu(\mu(q(ex_F V_{MD} + lV_{FM} - r_M V_{FD}) + lV_{FM}\chi)^2 + 4I_N q V_{FD} V_{FM} V_{MD} \chi(\theta - \mu))} + \mu(q(ex_F V_{MD} - lV_{FM} + r_M V_{FD}) - lV_{FM}\chi) - 2ex_F \theta q V_{MD}}{2q V_{FM} V_{MD}(\theta - \mu)} \quad (45)$$

$$D5^* = \frac{\sqrt{\mu(\mu(q(ex_F V_{MD} + lV_{FM} - r_M V_{FD}) + lV_{FM}\chi)^2 + 4I_N q V_{FD} V_{FM} V_{MD} \chi(\theta - \mu))} + \mu(q(-ex_F V_{MD} - lV_{FM} + r_M V_{FD}) - lV_{FM}\chi)}{2q V_{FD} V_{MD}(\theta - \mu)} \quad (46)$$

$$\delta 5^* = \theta \quad (47)$$

$$N5^* = \frac{-l\sqrt{\mu(\mu(q(ex_F V_{MD} + lV_{FM} - r_M V_{FD}) + lV_{FM}\chi)^2 + 4I_N q V_{FD} V_{FM} V_{MD} \chi(\theta - \mu))} + \mu l(q(ex_F V_{MD} + lV_{FM} - r_M V_{FD}) + lV_{FM}\chi) + 2I_N q V_{FD} V_{MD}(\theta - \mu)}{2q^2 V_{FD} V_{MD}(\theta - \mu)} \quad (48)$$

$$F5^* = \frac{-\theta\sqrt{\mu(\mu(q(ex_F V_{MD} + lV_{FM} - r_M V_{FD}) + lV_{FM}\chi)^2 + 4I_N q V_{FD} V_{FM} V_{MD} \chi(\theta - \mu))} + \theta\mu(q(ex_F V_{MD} + lV_{FM} + r_M V_{FD}) + lV_{FM}\chi) - 2\mu^2 q r_M V_{FD}}{2\mu q V_{FD} V_{FM}(\mu - \theta)} \quad (49)$$

$$(50)$$

8 Scenario IV

$$M6^* = \frac{-\theta\sqrt{(ex_M \mu q V_{FD} + l\mu V_{FM}(q + \chi) + qr_F V_{MD}\phi)^2 + 4I_N \mu q V_{FD} V_{FM} V_{MD} \chi(\mu - \theta)} + ex_M \theta \mu q V_{FD} + \theta l \mu q V_{FM} + \theta l \mu V_{FM} \chi - \theta q r_F V_{MD} \phi + 2\mu q r_F V_{MD} \phi}{2\mu q V_{FM} V_{MD}(\mu - \theta)} \quad (51)$$

$$D6^* = \frac{-\sqrt{(ex_M \mu q V_{FD} + l\mu V_{FM}(q + \chi) + qr_F V_{MD}\phi)^2 + 4I_N \mu q V_{FD} V_{FM} V_{MD} \chi(\mu - \theta)} + ex_M \mu q V_{FD} + l\mu q V_{FM} + l\mu V_{FM} \chi + qr_F V_{MD} \phi}{2q V_{FD} V_{MD}(\theta - \mu)} \quad (52)$$

$$\delta 6^* = \theta \quad (53)$$

$$N6^* = \frac{l\sqrt{(ex_M \mu q V_{FD} + l\mu V_{FM}(q + \chi) + qr_F V_{MD}\phi)^2 + 4I_N \mu q V_{FD} V_{FM} V_{MD} \chi(\mu - \theta)} + l(-(ex_M \mu q V_{FD} + l\mu V_{FM}(q + \chi) + qr_F V_{MD}\phi)) + 2I_N q V_{FD} V_{MD}(\theta - \mu)}{2q^2 V_{FD} V_{MD}(\theta - \mu)} \quad (54)$$

$$F6^* = \frac{-\sqrt{(ex_M \mu q V_{FD} + l\mu V_{FM}(q + \chi) + qr_F V_{MD}\phi)^2 + 4I_N \mu q V_{FD} V_{FM} V_{MD} \chi(\mu - \theta)} + ex_M q V_{FD}(2\theta - \mu) + l\mu q V_{FM} + l\mu V_{FM} \chi + qr_F V_{MD} \phi}{2q V_{FD} V_{FM}(\theta - \mu)} \quad (55)$$

$$(56)$$

9 Scenario 1 Derivatives

$$\frac{dN}{dV_{HP}} = \frac{l\mu V_{FM} A1}{\omega (l^2 \mu^2 V_{FM}^2 (qV_{HP} + t_H V_{PN}) + l\mu V_{FM} (qV_{HP} (V_{MD}\phi(2r_F + t_F) + \mu V_{FD}(-2r_M - t_M)) + t_H V_{PN} (r_F V_{MD}\phi - \mu r_M V_{FD} + \eta t_F V_{MD} + \eta(-t_M) V_{FD})) + qV_{HP} (\mu r_M V_{FD} - r_F V_{MD}\phi) (\mu V_{FD}(r_M + t_M) - V_{MD}\phi(r_F + t_F)))^2} \quad (57)$$

$$\frac{dN}{dV_{FD}} = \frac{A2}{\omega (l^2 \mu^2 V_{FM}^2 (qV_{HP} + t_H V_{PN}) + l\mu V_{FM} (qV_{HP} (V_{MD}\phi(2r_F + t_F) + \mu V_{FD}(-2r_M - t_M)) + t_H V_{PN} (r_F V_{MD}\phi - \mu r_M V_{FD} + \eta t_F V_{MD} + \eta(-t_M) V_{FD})) + qV_{HP} (\mu r_M V_{FD} - r_F V_{MD}\phi) (\mu V_{FD}(r_M + t_M) - V_{MD}\phi(r_F + t_F)))^2} \quad (58)$$

$$\frac{dN}{dV_{FM}} = \frac{l\mu A3}{\omega (l^2 \mu^2 V_{FM}^2 (qV_{HP} + t_H V_{PN}) + l\mu V_{FM} (qV_{HP} (V_{MD}\phi(2r_F + t_F) + \mu V_{FD}(-2r_M - t_M)) + t_H V_{PN} (r_F V_{MD}\phi - \mu r_M V_{FD} + \eta t_F V_{MD} + \eta(-t_M) V_{FD})) + qV_{HP} (\mu r_M V_{FD} - r_F V_{MD}\phi) (\mu V_{FD}(r_M + t_M) - V_{MD}\phi(r_F + t_F)))^2} \quad (59)$$

$$\frac{dN}{dV_{MD}} = \frac{A4}{\omega (l^2 \mu^2 V_{FM}^2 (qV_{HP} + t_H V_{PN}) + l\mu V_{FM} (qV_{HP} (V_{MD}\phi(2r_F + t_F) + \mu V_{FD}(-2r_M - t_M)) + t_H V_{PN} (r_F V_{MD}\phi - \mu r_M V_{FD} + \eta t_F V_{MD} + \eta(-t_M) V_{FD})) + qV_{HP} (\mu r_M V_{FD} - r_F V_{MD}\phi) (\mu V_{FD}(r_M + t_M) - V_{MD}\phi(r_F + t_F)))^2} \quad (60)$$

$$(61)$$

10 Scenario 2 Derivatives

$$\frac{dN}{dV_{HP}} = \frac{lV_{FM}(ex_H qt_P(ex_F V_{MD} + ex_M V_{FD} + lV_{FM}) + t_H V_{PN}(ex_F I_N V_{MD} - ex_F lt_M + ex_M I_N V_{FD} - ex_M lt_F + I_N lV_{FM}))}{(qV_{HP}(ex_F V_{MD} + ex_M V_{FD} + lV_{FM}) + lt_H V_{FM} V_{PN})^2} \quad (62)$$

$$\frac{dN}{dV_{FD}} = \frac{ex_M lV_{HP}(ex_F qt_M V_{HP} + ex_H qt_P V_{FM} + ex_M qt_F V_{HP} + I_N t_H V_{FM} V_{PN})}{(qV_{HP}(ex_F V_{MD} + ex_M V_{FD} + lV_{FM}) + lt_H V_{FM} V_{PN})^2} \quad (63)$$

$$\frac{dN}{dV_{FM}} = \frac{lV_{HP}(-ex_H qt_P(ex_F V_{MD} + ex_M V_{FD}) + t_H V_{PN}(-ex_F I_N V_{MD} + ex_F lt_M - ex_M I_N V_{FD} + ex_M lt_F) + lqV_{HP}(ex_F t_M + ex_M t_F))}{(qV_{HP}(ex_F V_{MD} + ex_M V_{FD} + lV_{FM}) + lt_H V_{FM} V_{PN})^2} \quad (64)$$

$$\frac{dN}{dV_{MD}} = \frac{ex_F lV_{HP}(ex_F qt_M V_{HP} + ex_H qt_P V_{FM} + ex_M qt_F V_{HP} + I_N t_H V_{FM} V_{PN})}{(qV_{HP}(ex_F V_{MD} + ex_M V_{FD} + lV_{FM}) + lt_H V_{FM} V_{PN})^2} \quad (65)$$

$$(66)$$

11 Scenario 3 Derivatives

$$\frac{dN}{dV_{HP}} = \frac{lV_{FM}(\eta qt_P(r_H + t_H)(ex_F V_{MD} + ex_M V_{FD} + lV_{FM}) - t_H \omega(V_{PN}(-ex_F I_N V_{MD} + ex_F l t_M - ex_M I_N V_{FD} + ex_M l t_F - I_N l V_{FM}) + qt_P(ex_F V_{MD} + ex_M V_{FD} + lV_{FM})))}{\omega(qV_{HP}(ex_F V_{MD} + ex_M V_{FD} + lV_{FM}) + lt_H V_{FM} V_{PN})^2} \quad (67)$$

$$\frac{dN}{dV_{FD}} = \frac{ex_M l V_{HP}(\omega(q(ex_F t_M V_{HP} + ex_M t_F V_{HP} - t_H t_P V_{FM}) + I_N t_H V_{FM} V_{PN}) + \eta qt_P V_{FM}(r_H + t_H))}{\omega(qV_{HP}(ex_F V_{MD} + ex_M V_{FD} + lV_{FM}) + lt_H V_{FM} V_{PN})^2} \quad (68)$$

$$\frac{dN}{dV_{FM}} = \frac{lV_{HP}(\omega(t_H V_{PN}(-ex_F I_N V_{MD} + ex_F l t_M - ex_M I_N V_{FD} + ex_M l t_F) + q(ex_F l t_M V_{HP} + ex_F t_H t_P V_{MD} + ex_M l t_F V_{HP} + ex_M t_H t_P V_{FD})) - \eta qt_P(r_H + t_H)(ex_F V_{MD} + ex_M V_{FD}))}{\omega(qV_{HP}(ex_F V_{MD} + ex_M V_{FD} + lV_{FM}) + lt_H V_{FM} V_{PN})^2} \quad (69)$$

$$\frac{dN}{dV_{MD}} = \frac{ex_F l V_{HP}(\omega(q(ex_F t_M V_{HP} + ex_M t_F V_{HP} - t_H t_P V_{FM}) + I_N t_H V_{FM} V_{PN}) + \eta qt_P V_{FM}(r_H + t_H))}{\omega(qV_{HP}(ex_F V_{MD} + ex_M V_{FD} + lV_{FM}) + lt_H V_{FM} V_{PN})^2} \quad (70)$$

$$(71)$$

12 Scenario 4 Derivatives

$$\frac{dN}{dV_{HP}} = \frac{l\mu V_{FM} A5}{(l^2 \mu^2 V_{FM}^2 (qV_{HP} + t_H V_{PN}) + l\mu V_{FM} (qV_{HP} (V_{MD} \phi(2r_F + t_F) + \mu V_{FD} (-2r_M - t_M)) + t_H V_{PN} (r_F V_{MD} \phi - \mu r_M V_{FD} + \eta t_F V_{MD} + \eta (-t_M) V_{FD})) + qV_{HP} (\mu r_M V_{FD} - r_F V_{MD} \phi) (\mu V_{FD} (r_M + t_M) - V_{MD} \phi(r_F + t_F)))^2} \quad (72)$$

$$\frac{dN}{dV_{FD}} = \frac{A6}{(l^2 \mu^2 V_{FM}^2 (qV_{HP} + t_H V_{PN}) + l\mu V_{FM} (qV_{HP} (V_{MD} \phi(2r_F + t_F) + \mu V_{FD} (-2r_M - t_M)) + t_H V_{PN} (r_F V_{MD} \phi - \mu r_M V_{FD} + \eta t_F V_{MD} + \eta (-t_M) V_{FD})) + qV_{HP} (\mu r_M V_{FD} - r_F V_{MD} \phi) (\mu V_{FD} (r_M + t_M) - V_{MD} \phi(r_F + t_F)))^2} \quad (73)$$

$$\frac{dN}{dV_{FM}} = \frac{l\mu A7}{(l^2 \mu^2 V_{FM}^2 (qV_{HP} + t_H V_{PN}) + l\mu V_{FM} (qV_{HP} (V_{MD} \phi(2r_F + t_F) + \mu V_{FD} (-2r_M - t_M)) + t_H V_{PN} (r_F V_{MD} \phi - \mu r_M V_{FD} + \eta t_F V_{MD} + \eta (-t_M) V_{FD})) + qV_{HP} (\mu r_M V_{FD} - r_F V_{MD} \phi) (\mu V_{FD} (r_M + t_M) - V_{MD} \phi(r_F + t_F)))^2} \quad (74)$$

$$\frac{dN}{dV_{MD}} = \frac{A8}{(l^2 \mu^2 V_{FM}^2 (qV_{HP} + t_H V_{PN}) + l\mu V_{FM} (qV_{HP} (V_{MD} \phi(2r_F + t_F) + \mu V_{FD} (-2r_M - t_M)) + t_H V_{PN} (r_F V_{MD} \phi - \mu r_M V_{FD} + \eta t_F V_{MD} + \eta (-t_M) V_{FD})) + qV_{HP} (\mu r_M V_{FD} - r_F V_{MD} \phi) (\mu V_{FD} (r_M + t_M) - V_{MD} \phi(r_F + t_F)))^2} \quad (75)$$

$$(76)$$

13 Scenario I Derivatives

$$\frac{dN}{dV_{HP}} = - \frac{I_N l \mu V_{FM} (l \mu V_{FM} + r_F V_{MD} \phi + \mu(-r_M) V_{FD})}{(q(l \mu V_{FM} + r_F V_{MD} \phi + \mu(-r_M) V_{FD}) + l \mu V_{FM} \chi)^2} \quad (77)$$

$$\frac{dN}{dV_{FD}} = - \frac{I_N l \mu^2 r_M V_{FM} \chi}{(q(l \mu V_{FM} + r_F V_{MD} \phi + \mu(-r_M) V_{FD}) + l \mu V_{FM} \chi)^2} \quad (78)$$

$$\frac{dN}{dV_{FM}} = \frac{I_N l \mu \chi (\mu r_M V_{FD} - r_F V_{MD} \phi)}{(q(l \mu V_{FM} + r_F V_{MD} \phi + \mu(-r_M) V_{FD}) + l \mu V_{FM} \chi)^2} \quad (79)$$

$$\frac{dN}{dV_{MD}} = \frac{I_N l \mu r_F V_{FM} \chi \phi}{(q(l \mu V_{FM} + r_F V_{MD} \phi + \mu(-r_M) V_{FD}) + l \mu V_{FM} \chi)^2} \quad (80)$$

$$(81)$$

14 Scenario II Derivatives

$$\frac{dN}{dV_{HP}} = - \frac{I_N l V_{FM} (e x_F V_{MD} + e x_M V_{FD} + l V_{FM})}{(e x_F q V_{MD} + e x_M q V_{FD} + l V_{FM} (q + \chi))^2} \quad (82)$$

$$\frac{dN}{dV_{FD}} = \frac{e x_M I_N l V_{FM} \chi}{(e x_F q V_{MD} + e x_M q V_{FD} + l V_{FM} (q + \chi))^2} \quad (83)$$

$$\frac{dN}{dV_{FM}} = - \frac{I_N l \chi (e x_F V_{MD} + e x_M V_{FD})}{(e x_F q V_{MD} + e x_M q V_{FD} + l V_{FM} (q + \chi))^2} \quad (84)$$

$$\frac{dN}{dV_{MD}} = \frac{e x_F I_N l V_{FM} \chi}{(e x_F q V_{MD} + e x_M q V_{FD} + l V_{FM} (q + \chi))^2} \quad (85)$$

$$(86)$$

15 Scenario III Derivatives

$$\frac{dN}{dV_{HP}} = \frac{l\mu V_{FM} \left(l - \frac{l\mu(q(ex_F V_{MD} + lV_{FM} - r_M V_{FD}) + lV_{FM}\chi) + 2I_N q V_{FD} V_{MD}(\theta - \mu)}{\sqrt{\mu(\mu(q(ex_F V_{MD} + lV_{FM} - r_M V_{FD}) + lV_{FM}\chi)^2 + 4I_N q V_{FD} V_{FM} V_{MD}\chi(\theta - \mu))}} \right)}{2q^2 V_{FD} V_{MD}(\theta - \mu)} \quad (87)$$

$$\frac{dN}{dV_{FD}} = \frac{l\sqrt{\mu(\mu(q(ex_F V_{MD} + lV_{FM} - r_M V_{FD}) + lV_{FM}\chi)^2 + 4I_N q V_{FD} V_{FM} V_{MD}\chi(\theta - \mu))} + qV_{FD} \left(\frac{l\mu(\mu q r_M (ex_F V_{MD} + lV_{FM} - r_M V_{FD}) + V_{FM}\chi(2I_N V_{MD}(\mu - \theta) + l\mu r_M))}{\sqrt{\mu(\mu(q(ex_F V_{MD} + lV_{FM} - r_M V_{FD}) + lV_{FM}\chi)^2 + 4I_N q V_{FD} V_{FM} V_{MD}\chi(\theta - \mu))}} + 2I_N V_{MD}(\theta - \mu) - l\mu r_M \right) - \mu l(q(ex_F V_{MD} + lV_{FM} - r_M V_{FD}) + lV_{FM}\chi) + 2I_N q V_{FD} V_{MD}(\mu - \theta)}{2q^2 V_{FD}^2 V_{MD}(\theta - \mu)} \quad (88)$$

$$\frac{dN}{dV_{FM}} = \frac{l\mu \left(\frac{l\mu q(q+\chi)(r_M V_{FD} - ex_F V_{MD}) + 2I_N q V_{FD} V_{MD}\chi(\mu - \theta) - l^2 \mu V_{FM}(q+\chi)^2}{\sqrt{\mu(\mu(q(ex_F V_{MD} + lV_{FM} - r_M V_{FD}) + lV_{FM}\chi)^2 + 4I_N q V_{FD} V_{FM} V_{MD}\chi(\theta - \mu))}} + l(q + \chi) \right)}{2q^2 V_{FD} V_{MD}(\theta - \mu)} \quad (89)$$

$$\frac{dN}{dV_{MD}} = \frac{l\sqrt{\mu(\mu(q(ex_F V_{MD} + lV_{FM} - r_M V_{FD}) + lV_{FM}\chi)^2 + 4I_N q V_{FD} V_{FM} V_{MD}\chi(\theta - \mu))} + qV_{MD} \left(\frac{l\mu(-V_{FM}\chi(ex_F l\mu + 2I_N V_{FD}(\theta - \mu)) - ex_F \mu q(ex_F V_{MD} + lV_{FM} - r_M V_{FD}))}{\sqrt{\mu(\mu(q(ex_F V_{MD} + lV_{FM} - r_M V_{FD}) + lV_{FM}\chi)^2 + 4I_N q V_{FD} V_{FM} V_{MD}\chi(\theta - \mu))}} + ex_F l\mu + 2I_N V_{FD}(\theta - \mu) \right) - \mu l(q(ex_F V_{MD} + lV_{FM} - r_M V_{FD}) + lV_{FM}\chi) + 2I_N q V_{FD} V_{MD}(\mu - \theta)}{2q^2 V_{FD} V_{MD}^2(\theta - \mu)} \quad (90)$$

$$(91)$$

16 Scenario IV Derivatives

$$\frac{dN}{dV_{HP}} = \frac{l\mu V_{FM} \left(\frac{l(ex_M \mu q V_{FD} + l\mu V_{FM}(q+\chi) + q r_F V_{MD}\phi) + 2I_N q V_{FD} V_{MD}(\mu - \theta)}{\sqrt{(ex_M \mu q V_{FD} + l\mu V_{FM}(q+\chi) + q r_F V_{MD}\phi)^2 + 4I_N \mu q V_{FD} V_{FM} V_{MD}\chi(\mu - \theta)}} - l \right)}{2q^2 V_{FD} V_{MD}(\theta - \mu)} \quad (92)$$

$$\frac{dN}{dV_{FD}} = \frac{qV_{FD} \left(\frac{l\mu(ex_M^2 \mu q V_{FD} + ex_M(l\mu V_{FM}(q+\chi) + q r_F V_{MD}\phi) + 2I_N V_{FM} V_{MD}\chi(\mu - \theta))}{\sqrt{(ex_M \mu q V_{FD} + l\mu V_{FM}(q+\chi) + q r_F V_{MD}\phi)^2 + 4I_N \mu q V_{FD} V_{FM} V_{MD}\chi(\mu - \theta)}} - ex_M l\mu + 2I_N V_{MD}(\theta - \mu) \right) - l\sqrt{(ex_M \mu q V_{FD} + l\mu V_{FM}(q+\chi) + q r_F V_{MD}\phi)^2 + 4I_N \mu q V_{FD} V_{FM} V_{MD}\chi(\mu - \theta)} + l(ex_M \mu q V_{FD} + l\mu V_{FM}(q+\chi) + q r_F V_{MD}\phi) + 2I_N q V_{FD} V_{MD}(\mu - \theta)}{2q^2 V_{FD}^2 V_{MD}(\theta - \mu)} \quad (93)$$

$$\frac{dN}{dV_{FM}} = \frac{l \left(\frac{2l\mu(q+\chi)(ex_M \mu q V_{FD} + l\mu V_{FM}(q+\chi) + q r_F V_{MD}\phi) + 4I_N \mu q V_{FD} V_{MD}\chi(\mu - \theta)}{\sqrt{(ex_M \mu q V_{FD} + l\mu V_{FM}(q+\chi) + q r_F V_{MD}\phi)^2 + 4I_N \mu q V_{FD} V_{FM} V_{MD}\chi(\mu - \theta)}} - 2l\mu(q + \chi) \right)}{4q^2 V_{FD} V_{MD}(\theta - \mu)} \quad (94)$$

$$\frac{dN}{dV_{MD}} = \frac{-l\sqrt{(ex_M \mu q V_{FD} + l\mu V_{FM}(q+\chi) + q r_F V_{MD}\phi)^2 + 4I_N \mu q V_{FD} V_{FM} V_{MD}\chi(\mu - \theta)} + qV_{MD} \left(\frac{l(q r_F \phi(ex_M \mu V_{FD} + l\mu V_{FM} + r_F V_{MD}\phi) + \mu V_{FM}\chi(2I_N V_{FD}(\mu - \theta) + l r_F \phi))}{\sqrt{(ex_M \mu q V_{FD} + l\mu V_{FM}(q+\chi) + q r_F V_{MD}\phi)^2 + 4I_N \mu q V_{FD} V_{FM} V_{MD}\chi(\mu - \theta)}} + 2I_N V_{FD}(\theta - \mu) - l r_F \phi \right) + l(ex_M \mu q V_{FD} + l\mu V_{FM}(q+\chi) + q r_F V_{MD}\phi) + 2I_N q V_{FD} V_{MD}(\mu - \theta)}{2q^2 V_{FD} V_{MD}^2(\theta - \mu)} \quad (95)$$

$$(96)$$

17 Additional Equations

$$\begin{aligned}
M1_{NUM} &= (\mu t_H V_{FM} V_{PN} (V_{HP} \phi(\eta V_{MD}(r_F + t_F)(lt_F - I_N V_{FD}) + l\mu(lV_{FM}(r_F + t_F) - r_F V_{FD}(r_M + t_M))) - \eta\mu V_{FD}(V_{HP}((r_M + t_M)(lt_F - I_N V_{FD}) + I_N lV_{FM}) \\
&\quad + lt_P V_{FM}(r_H + t_H)) + lr_F V_{HP} V_{MD} \phi^2(r_F + t_F)) + qV_{HP}(\mu(V_{FD}(r_M + t_M) \\
&\quad - lV_{FM}) - V_{MD} \phi(r_F + t_F))(V_{HP} \phi(\mu(r_F V_{FD}(r_M + t_M) - lV_{FM}(r_F + t_F)) - r_F V_{MD} \phi(r_F + t_F)) + \eta\mu r_H t_P V_{FD} V_{FM})) \\
M1_{DEN} &= (l^2 \mu^2 V_{FM}^2 (qV_{HP} + t_H V_{PN}) + l\mu V_{FM} (qV_{HP} (V_{MD} \phi(2r_F + t_F) \\
&\quad + \mu V_{FD}(-2r_M - t_M)) + t_H V_{PN} (r_F V_{MD} \phi - \mu r_M V_{FD} + \eta t_F V_{MD} + \eta(-t_M) V_{FD})) + qV_{HP} (\mu r_M V_{FD} - r_F V_{MD} \phi) (\mu V_{FD}(r_M + t_M) - V_{MD} \phi(r_F + t_F)) \\
D1_{NUM} &= (-\mu \phi(-I_N r_F t_H V_{FM} V_{MD} V_{PN} + qt_M V_{HP} (r_F V_{FD}(r_M + t_M) - lV_{FM}(r_F + t_F)) + qV_{MD} (r_M t_F V_{HP}(r_F + t_F) + r_F t_H t_P V_{FM})) + \mu(\mu(r_M V_{FD} \\
&\quad - lV_{FM})(-I_N t_H V_{FM} V_{PN} + qt_F V_{HP}(r_M + t_M) + qt_H t_P V_{FM}) - \eta V_{FM} (t_M V_{FD} - t_F V_{MD})(I_N t_H V_{PN} + qr_H t_P)) + qr_F t_M V_{HP} V_{MD} \phi^2(r_F + t_F)) \\
D1_{DEN} &= (l^2 \mu^2 V_{FM}^2 (qV_{HP} + t_H V_{PN}) + l\mu V_{FM} (qV_{HP} (V_{MD} \phi(2r_F + t_F) + \mu V_{FD}(-2r_M - t_M)) + t_H V_{PN} (r_F V_{MD} \phi \\
&\quad - \mu r_M V_{FD} + \eta t_F V_{MD} + \eta(-t_M) V_{FD})) + qV_{HP} (\mu r_M V_{FD} - r_F V_{MD} \phi) (\mu V_{FD}(r_M + t_M) - V_{MD} \phi(r_F + t_F))) \\
\delta 1_{NUM} &= (lV_{FM} (\omega(\eta\mu(t_H V_{PN} (I_N V_{FM} V_{HP} + t_P V_{FM}(r_H + t_H) + t_F V_{HP}(r_M + t_M)) + qr_H t_P V_{FM} V_{HP}) - V_{HP} \phi(\mu(qV_{HP} + t_H V_{PN})(r_M t_F - r_F t_M) + \eta t_H t_M V_{PN}(r_F + t_F))) - \eta^2 \mu t_H t_P V_{FM} V_{PN}(r_H + t_H)) \\
&\quad - V_{HP} \omega(\mu V_{FD}(r_M + t_M) - V_{MD} \phi(r_F + t_F))(\eta I_N t_H V_{FM} V_{PN} + q(r_F t_M V_{HP} \phi + \eta r_H t_P V_{FM} - r_M t_F V_{HP} \phi))) \\
\delta 1_{DEN} &= (-\mu \phi(-I_N r_F t_H V_{FM} V_{MD} V_{PN} + qt_M V_{HP} (r_F V_{FD}(r_M + t_M) - lV_{FM}(r_F + t_F)) + qV_{MD} (r_M t_F V_{HP}(r_F + t_F) + r_F t_H t_P V_{FM})) \\
&\quad + \mu(\mu(r_M V_{FD} - lV_{FM})(-I_N t_H V_{FM} V_{PN} + qt_F V_{HP}(r_M + t_M) + qt_H t_P V_{FM}) - \eta V_{FM} (t_M V_{FD} - t_F V_{MD})(I_N t_H V_{PN} + qr_H t_P)) + qr_F t_M V_{HP} V_{MD} \phi^2(r_F + t_F)) \\
N1_{NUM} &= \mu l^2 V_{FM} (\mu V_{HP} (I_N V_{FM} + t_F(r_M + t_M)) - t_M V_{HP} \phi(r_F + t_F) + \mu t_H t_P V_{FM}) + l(\mu \phi(V_{MD} (V_{HP} (I_N V_{FM} (2r_F + t_F) + r_M t_F(r_F + t_F)) + r_F t_H t_P V_{FM}) + r_F t_M V_{FD} V_{HP}(r_M + t_M)) \\
&\quad + \mu^2(-V_{FD})(V_{HP} (I_N V_{FM} (2r_M + t_M) + r_M t_F(r_M + t_M)) + r_M t_H t_P V_{FM}) - r_F t_M V_{HP} V_{MD} \phi^2(r_F + t_F) + \eta\mu r_H t_P V_{FM} (t_M V_{FD} - t_F V_{MD})) + I_N V_{HP} (\mu r_M V_{FD} - r_F V_{MD} \phi) (\mu V_{FD}(r_M + t_M) - V_{MD} \phi(r_F + t_F)) \\
H1_{NUM} &= \mu l^2 V_{FM} V_{HP} (\mu V_{PN} (I_N V_{FM} + t_F(r_M + t_M)) + \mu(-q)t_P V_{FM} - t_M V_{PN} \phi(r_F + t_F)) + l(\mu V_{HP} \phi(V_{PN} (V_{MD} (I_N V_{FM} (2r_F + t_F) + r_M t_F(r_F + t_F)) \\
&\quad + r_F t_M V_{FD}(r_M + t_M)) - qt_P V_{FM} V_{MD} (2r_F + t_F)) + \mu(\mu V_{FD} V_{HP} (qt_P V_{FM} (2r_M + t_M) - V_{PN} (I_N V_{FM} (2r_M + t_M) + r_M t_F(r_M + t_M))) \\
&\quad + \eta t_P V_{FM} V_{PN}(r_H + t_H)(t_M V_{FD} - t_F V_{MD})) - r_F t_M V_{HP} V_{MD} V_{PN} \phi^2(r_F + t_F)) - V_{HP} (qt_P - I_N V_{PN}) (\mu r_M V_{FD} - r_F V_{MD} \phi) (\mu V_{FD}(r_M + t_M) - V_{MD} \phi(r_F + t_F))) \\
\delta 2_{NUM} &= ex_M V_{HP} (q(V_{HP} (t_F \phi(V_{MD} (ex_F + t_F) + lV_{FM} - t_M V_{FD}) + ex_F \mu t_M V_{FD}) + ex_H t_P V_{FD} V_{FM} \omega + t_H t_P V_{FD} V_{FM} (\omega - \eta)) \\
&\quad + t_H V_{FM} V_{PN} (\eta I_N V_{FD} + lt_F (\phi - \eta))) + lV_{FM} (t_H V_{PN} (V_{HP} (ex_F t_M (\mu - \eta) + \eta I_N V_{FM} + t_F t_M (\mu - \phi)) + ex_H t_P V_{FM} (\omega - \eta) \\
&\quad + t_H t_P V_{FM} (\omega - \eta)) + qV_{HP} (t_M V_{HP} (\mu (ex_F + t_F) - t_F \phi) + t_P V_{FM} (\omega (ex_H + t_H) - \eta t_H))) + ex_M^2 qt_F V_{FD} V_{HP}^2 \phi \\
\delta 3_{NUM} &= I_N t_H V_{FM} V_{HP} V_{PN} \omega (ex_F \eta V_{MD} + ex_M \eta V_{FD} + t_F V_{MD} \phi - \mu t_M V_{FD}) + qV_{HP} (\eta r_H t_P V_{FM} (ex_F V_{MD} \omega \\
&\quad + ex_M V_{FD} \omega + t_F V_{MD} \phi + \mu(-t_M) V_{FD}) + V_{HP} \omega (ex_F \mu t_M + ex_M t_F \phi) (V_{MD} (ex_F + t_F) + V_{FD} (ex_M - t_M)) - t_H t_P V_{FM} (\eta - \omega) (\mu t_M V_{FD} - t_F V_{MD} \phi)) \\
M4_{NUM} &= (ex_H \mu lt_P V_{FD} V_{FM} (\eta - \omega) + l(V_{HP} (-\eta\mu V_{FD} (I_N V_{FM} + t_F(r_M + t_M)) + \phi(\eta t_F V_{MD}(r_F + t_F) - \mu r_F V_{FD}(r_M + t_M)) + r_F V_{MD} \phi^2(r_F + t_F)) \\
&\quad + \mu t_H t_P V_{FD} V_{FM} (\eta - \omega)) + \eta I_N V_{FD} V_{HP} (\mu V_{FD}(r_M + t_M) - V_{MD} \phi(r_F + t_F)) + \mu l^2 V_{FM} V_{HP} \phi(r_F + t_F)) \\
N4_{NUM} &= (ex_H \mu t_P V_{FM} (-V_{MD} (r_F \phi + t_F \omega) + \mu r_M V_{FD} + t_M V_{FD} \omega) + V_{HP} (\mu \phi(V_{MD} (I_N V_{FM} (2r_F + t_F) + r_M t_F(r_F + t_F)) + r_F t_M V_{FD}(r_M \\
&\quad + t_M)) + \mu^2(-V_{FD})(I_N V_{FM} (2r_M + t_M) + r_M t_F(r_M + t_M)) - r_F t_M V_{MD} \phi^2(r_F + t_F)) - \mu t_H t_P V_{FM} (\eta - \omega) (t_M V_{FD} - t_F V_{MD})) \\
H4_{NUM} &= (-ex_H \mu lt_P V_{FM} (l\mu V_{FM} + r_F V_{MD} \phi + \mu(-r_M) V_{FD} + t_F V_{MD} \omega - t_M V_{FD} \omega) + \mu l^2 V_{FM} (\mu V_{HP} (I_N V_{FM} + t_F(r_M + t_M)) - t_M V_{HP} \phi(r_F + t_F) \\
&\quad + \mu(-t_H) t_P V_{FM}) + l(\mu r_M (-\mu V_{FD} V_{HP} (2I_N V_{FM} + t_F t_M) + V_{HP} \phi(t_F V_{MD}(r_F + t_F) + r_F t_M V_{FD}) + \mu t_H t_P V_{FD} V_{FM}) + I_N \mu V_{FM} V_{HP} (V_{MD} \phi(2r_F + t_F) - \mu t_M V_{FD}) \\
&\quad + r_F \phi(-t_M V_{HP} V_{MD} \phi(r_F + t_F) - \mu t_H t_P V_{FM} V_{MD} + \mu t_M^2 V_{FD} V_{HP}) + \mu^2(-r_M^2) t_F V_{FD} V_{HP} + \mu t_H t_P V_{FM} \omega (t_M V_{FD} - t_F V_{MD})) + I_N V_{HP} (\mu r_M V_{FD} - r_F V_{MD} \phi) (\mu V_{FD}(r_M + t_M) - V_{MD} \phi(r_F + t_F))) \\
F4_{NUM} &= (l(\eta\mu (t_P V_{FM} V_{MD} (ex_H + t_H) - V_{HP} (I_N V_{FM} V_{MD} + t_M^2 V_{FD})) \\
&\quad - \mu t_P V_{FM} V_{MD} \omega (ex_H + t_H) + \mu r_M V_{HP} (V_{MD} \phi(r_F + t_F) - t_M V_{FD} (\eta + \mu)) \\
&\quad + \eta t_M V_{HP} V_{MD} \phi(r_F + t_F) + \mu^2(-r_M^2) V_{FD} V_{HP}) + \eta I_N V_{HP} V_{MD} (\mu V_{FD}(r_M + t_M) - V_{MD} \phi(r_F + t_F)) + l^2 \mu^2 V_{FM} V_{HP} (r_M + t_M))
\end{aligned}$$

$$\begin{aligned}
A1 &= (t_H V_{PN} \omega (\mu \phi (V_{MD} (I_N l V_{FM} (2r_F + t_F) - I_N V_{FD} (2r_F r_M + r_F t_M + r_M t_F) + l r_M t_F (r_F + t_F)) + l t_M (r_F V_{FD} (r_M + t_M) - l V_{FM} (r_F + t_F))) \\
&\quad + r_F V_{MD} \phi^2 (r_F + t_F) (I_N V_{MD} - l t_M) + \mu^2 (l V_{FM} - r_M V_{FD}) ((r_M + t_M) (l t_F - I_N V_{FD}) + I_N l V_{FM})) (l \mu V_{FM} + r_F V_{MD} \phi - \mu r_M V_{FD} \\
&\quad + \eta t_F V_{MD} + \eta (-t_M) V_{FD}) - q t_P (-l \mu V_{FM} - r_F V_{MD} \phi + \mu r_M V_{FD}) (\mu (V_{FD} (r_M + t_M) - l V_{FM}) - V_{MD} \phi (r_F + t_F)) (\omega (t_H (l \mu V_{FM} \\
&\quad + r_F V_{MD} \phi + \mu (-r_M) V_{FD}) + \eta r_H (t_M V_{FD} - t_F V_{MD})) + \eta (r_H + t_H) (-l \mu V_{FM} - r_F V_{MD} \phi + \mu r_M V_{FD}))) \\
A2 &= \mu (l^2 \mu^2 V_{FM}^2 (q V_{HP} + t_H V_{PN}) + l \mu V_{FM} (q V_{HP} (V_{MD} \phi (2r_F + t_F) + \mu V_{FD} (-2r_M - t_M)) + t_H V_{PN} (r_F V_{MD} \phi - \mu r_M V_{FD} + \eta t_F V_{MD} + \eta (-t_M) V_{FD})) + q V_{HP} (\mu r_M V_{FD} - r_F V_{MD} \phi) (\mu V_{FD} (r_M + t_M) - V_{MD} \phi (r_F + t_F))) \\
&\quad (\omega (l (-\mu (V_{HP} (I_N V_{FM} (2r_M + t_M) + r_M t_F (r_M + t_M)) + r_M t_H t_P V_{FM}) + r_F t_M V_{HP} \phi (r_M + t_M) + \eta r_H t_M t_P V_{FM}) + I_N V_{HP} (2\mu r_M V_{FD} (r_M + t_M) - V_{MD} \phi (r_F (2r_M + t_M) + r_M t_F))) \\
&\quad + \eta l \mu r_M t_P V_{FM} (r_H + t_H)) - \mu (q V_{HP} (2\mu r_M V_{FD} (r_M + t_M) - V_{MD} \phi (r_F (2r_M + t_M) + r_M t_F)) - l V_{FM} (\mu q V_{HP} (2r_M + t_M) + t_H V_{PN} (\mu r_M + \eta t_M))) (\omega (\mu l^2 V_{FM} (\mu V_{HP} (I_N V_{FM} + t_F (r_M + t_M)) - t_M V_{HP} \phi (r_F + t_F) + \mu t_H t_P V_{FM}) \\
&\quad + l (\mu \phi (V_{MD} (V_{HP} (I_N V_{FM} (2r_F + t_F) + r_M t_F (r_F + t_F)) + r_F t_H t_P V_{FM}) + r_F t_M V_{FD} V_{HP} (r_M + t_M)) + \mu^2 (-V_{FD}) (V_{HP} (I_N V_{FM} (2r_M + t_M) + r_M t_F (r_M + t_M)) + r_M t_H t_P V_{FM}) - r_F t_M V_{HP} V_{MD} \phi^2 (r_F + t_F) + \eta \mu r_H t_P V_{FM} (t_M V_{FD} - t_F V_{MD})) \\
&\quad + I_N V_{HP} (\mu r_M V_{FD} - r_F V_{MD} \phi) (\mu V_{FD} (r_M + t_M) - V_{MD} \phi (r_F + t_F))) - \eta l \mu t_P V_{FM} (r_H + t_H) (l \mu V_{FM} + r_F V_{MD} \phi + \mu (-r_M) V_{FD})) \\
A3 &= ((l^2 \mu^2 V_{FM}^2 (q V_{HP} + t_H V_{PN}) + l \mu V_{FM} (q V_{HP} (V_{MD} \phi (2r_F + t_F) + \mu V_{FD} (-2r_M - t_M)) + t_H V_{PN} (r_F V_{MD} \phi - \mu r_M V_{FD} + \eta t_F V_{MD} + \eta (-t_M) V_{FD})) \\
&\quad + q V_{HP} (\mu r_M V_{FD} - r_F V_{MD} \phi) (\mu V_{FD} (r_M + t_M) - V_{MD} \phi (r_F + t_F))) (\omega (\phi (V_{MD} (I_N V_{HP} (2r_F + t_F) + r_F t_H t_P) - l t_M V_{HP} (r_F + t_F)) + \mu (V_{HP} (2I_N l V_{FM} - I_N V_{FD} (2r_M + t_M) \\
&\quad + l t_F (r_M + t_M)) + t_H t_P (2l V_{FM} - r_M V_{FD})) + \eta r_H t_P (t_M V_{FD} - t_F V_{MD})) + \eta t_P (r_H + t_H) (-2l \mu V_{FM} - r_F V_{MD} \phi + \mu r_M V_{FD})) - (q V_{HP} (2l \mu V_{FM} + V_{MD} \phi (2r_F + t_F) - 2\mu r_M V_{FD} - \mu t_M V_{FD}) \\
&\quad + t_H V_{PN} (2l \mu V_{FM} + r_F V_{MD} \phi - \mu r_M V_{FD} + \eta t_F V_{MD} + \eta (-t_M) V_{FD})) (\omega (\mu l^2 V_{FM} (\mu V_{HP} (I_N V_{FM} + t_F (r_M + t_M)) - t_M V_{HP} \phi (r_F + t_F) + \mu t_H t_P V_{FM}) + l (\mu \phi (V_{MD} (V_{HP} (I_N V_{FM} (2r_F + t_F) \\
&\quad + r_M t_F (r_F + t_F)) + r_F t_H t_P V_{FM}) + r_F t_M V_{FD} V_{HP} (r_M + t_M)) + \mu^2 (-V_{FD}) (V_{HP} (I_N V_{FM} (2r_M + t_M) + r_M t_F (r_M + t_M)) + r_M t_H t_P V_{FM}) - r_F t_M V_{HP} V_{MD} \phi^2 (r_F + t_F) \\
&\quad + \eta \mu r_H t_P V_{FM} (t_M V_{FD} - t_F V_{MD})) + I_N V_{HP} (\mu r_M V_{FD} - r_F V_{MD} \phi) (\mu V_{FD} (r_M + t_M) - V_{MD} \phi (r_F + t_F))) - \eta l \mu t_P V_{FM} (r_H + t_H) (l \mu V_{FM} + r_F V_{MD} \phi + \mu (-r_M) V_{FD}))) \\
A4 &= (l^2 \mu^2 V_{FM}^2 (q V_{HP} + t_H V_{PN}) + l \mu V_{FM} (q V_{HP} (V_{MD} \phi (2r_F + t_F) + \mu V_{FD} (-2r_M - t_M)) + t_H V_{PN} (r_F V_{MD} \phi - \mu r_M V_{FD} \\
&\quad + \eta t_F V_{MD} + \eta (-t_M) V_{FD})) + q V_{HP} (\mu r_M V_{FD} - r_F V_{MD} \phi) (\mu V_{FD} (r_M + t_M) - V_{MD} \phi (r_F + t_F))) (\omega (\mu \phi (l V_{HP} (I_N V_{FM} (2r_F + t_F) + r_M t_F (r_F + t_F)) - I_N V_{FD} V_{HP} (r_F (2r_M + t_M) + r_M t_F) \\
&\quad + l r_F t_H t_P V_{FM}) - r_F V_{HP} \phi^2 (r_F + t_F) (l t_M - 2I_N V_{MD}) - \eta l \mu r_H t_F t_P V_{FM}) - \eta l \mu r_F t_P V_{FM} \phi (r_H + t_H)) - (l \mu V_{FM} (2q r_F V_{HP} \phi + q t_F V_{HP} \phi + r_F t_H V_{PN} \phi \\
&\quad + \eta t_F t_H V_{PN}) + q V_{HP} \phi (\mu V_{FD} (-r_F (2r_M + t_M) - r_M t_F) + 2r_F V_{MD} \phi (r_F + t_F))) (\omega (\mu l^2 V_{FM} (\mu V_{HP} (I_N V_{FM} + t_F (r_M + t_M)) - t_M V_{HP} \phi (r_F + t_F) + \mu t_H t_P V_{FM}) + l (\mu \phi (V_{MD} (V_{HP} (I_N V_{FM} (2r_F + t_F) + r_M t_F (r_F + t_F)) + r_F t_H t_P V_{FM}) \\
&\quad + r_F t_M V_{FD} V_{HP} (r_M + t_M)) + \mu^2 (-V_{FD}) (V_{HP} (I_N V_{FM} (2r_M + t_M) + r_M t_F (r_M + t_M)) + r_M t_H t_P V_{FM}) - r_F t_M V_{HP} V_{MD} \phi^2 (r_F + t_F) \\
&\quad + \eta \mu r_H t_P V_{FM} (t_M V_{FD} - t_F V_{MD})) + I_N V_{HP} (\mu r_M V_{FD} - r_F V_{MD} \phi) (\mu V_{FD} (r_M + t_M) - V_{MD} \phi (r_F + t_F))) - \eta l \mu t_P V_{FM} (r_H + t_H) (l \mu V_{FM} + r_F V_{MD} \phi + \mu (-r_M) V_{FD}))) \\
A5 &= (t_H V_{PN} (\mu \phi (V_{MD} (I_N l V_{FM} (2r_F + t_F) - I_N V_{FD} (2r_F r_M + r_F t_M + r_M t_F) + l r_M t_F (r_F + t_F)) + l t_M (r_F V_{FD} (r_M + t_M) - l V_{FM} (r_F + t_F))) \\
&\quad + r_F V_{MD} \phi^2 (r_F + t_F) (I_N V_{MD} - l t_M) + \mu^2 (l V_{FM} - r_M V_{FD}) ((r_M + t_M) (l t_F - I_N V_{FD}) + I_N l V_{FM})) (l \mu V_{FM} + r_F V_{MD} \phi - \mu r_M V_{FD} \\
&\quad + \eta t_F V_{MD} + \eta (-t_M) V_{FD}) - q t_P (-l \mu V_{FM} - r_F V_{MD} \phi + \mu r_M V_{FD}) (\mu (V_{FD} (r_M + t_M) - l V_{FM}) \\
&\quad - V_{MD} \phi (r_F + t_F)) (-e x_H l \mu V_{FM} - e x_H r_F V_{MD} \phi + e x_H \mu r_M V_{FD} + \omega (e x_H + t_H) (t_M V_{FD} - t_F V_{MD}) + \eta t_F t_H V_{MD} + \eta (-t_H) t_M V_{FD})) \\
A6 &= \mu (l^2 \mu^2 V_{FM}^2 (q V_{HP} + t_H V_{PN}) + l \mu V_{FM} (q V_{HP} (V_{MD} \phi (2r_F + t_F) + \mu V_{FD} (-2r_M - t_M)) + t_H V_{PN} (r_F V_{MD} \phi - \mu r_M V_{FD} \\
&\quad + \eta t_F V_{MD} + \eta (-t_M) V_{FD})) + q V_{HP} (\mu r_M V_{FD} - r_F V_{MD} \phi) (\mu V_{FD} (r_M + t_M) - V_{MD} \phi (r_F + t_F))) (l (e x_H t_P V_{FM} (\mu r_M + t_M \omega) \\
&\quad + \mu V_{HP} (-I_N V_{FM} (2r_M + t_M) - r_M t_F (r_M + t_M)) + r_F t_M V_{HP} \phi (r_M + t_M) + t_H t_M t_P V_{FM} (\omega - \eta)) \\
&\quad + I_N V_{HP} (2\mu r_M V_{FD} (r_M + t_M) - V_{MD} \phi (r_F (2r_M + t_M) + r_M t_F))) - \mu (q V_{HP} (2\mu r_M V_{FD} (r_M + t_M) - V_{MD} \phi (r_F (2r_M + t_M) \\
&\quad + r_M t_F)) - l V_{FM} (\mu q V_{HP} (2r_M + t_M) + t_H V_{PN} (\mu r_M + \eta t_M))) (\mu l^2 V_{FM} (-e x_H \mu t_P V_{FM} + \mu V_{HP} (I_N V_{FM} + t_F (r_M + t_M)) - t_M V_{HP} \phi (r_F + t_F)) + l (e x_H \mu t_P V_{FM} (-V_{MD} (r_F \phi + t_F \omega) + \mu r_M V_{FD} + t_M V_{FD} \omega) \\
&\quad + V_{HP} (\mu \phi (V_{MD} (I_N V_{FM} (2r_F + t_F) + r_M t_F (r_F + t_F)) + r_F t_M V_{FD} (r_M + t_M)) + \mu^2 (-V_{FD}) (I_N V_{FM} (2r_M + t_M) + r_M t_F (r_M + t_M)) - r_F t_M V_{MD} \phi^2 (r_F + t_F)) \\
&\quad - \mu t_H t_P V_{FM} (\eta - \omega) (t_M V_{FD} - t_F V_{MD})) + I_N V_{HP} (\mu r_M V_{FD} - r_F V_{MD} \phi) (\mu V_{FD} (r_M + t_M) - V_{MD} \phi (r_F + t_F)))
\end{aligned}$$

(98)

$$\begin{aligned}
A7 = & ((l^2\mu^2V_{FM}^2(qV_{HP} + t_HV_{PN}) + l\mu V_{FM}(qV_{HP}(V_{MD}\phi(2r_F + t_F) + \mu V_{FD}(-2r_M - t_M)) + t_HV_{PN}(r_FV_{MD}\phi - \mu r_MV_{FD} \\
& + \eta t_FV_{MD} + \eta(-t_M)V_{FD})) + qV_{HP}(\mu r_MV_{FD} - r_FV_{MD}\phi)(\mu V_{FD}(r_M + t_M) - V_{MD}\phi(r_F + t_F)))(ex_Ht_P(-2l\mu V_{FM} - V_{MD}(r_F\phi + t_F\omega) + \mu r_MV_{FD} + t_MV_{FD}\omega) \\
& + V_{HP}\phi(I_NV_{MD}(2r_F + t_F) - lt_M(r_F + t_F)) + \mu V_{HP}(2I_NlV_{FM} - I_NV_{FD}(2r_M + t_M) \\
& + lt_F(r_M + t_M)) - t_Ht_P(\eta - \omega)(t_MV_{FD} - t_FV_{MD})) - (qV_{HP}(2l\mu V_{FM} + V_{MD}\phi(2r_F + t_F) \\
& - 2\mu r_MV_{FD} - \mu t_MV_{FD}) + t_HV_{PN}(2l\mu V_{FM} + r_FV_{MD}\phi - \mu r_MV_{FD} + \eta t_FV_{MD} + \eta(-t_M)V_{FD}))(\mu l^2V_{FM}(-ex_H\mu t_PV_{FM} + \mu V_{HP}(I_NV_{FM} + t_F(r_M + t_M)) - t_MV_{HP}\phi(r_F + t_F)) + l(ex_H\mu t_PV_{FM}(-V_{MD}(r_F\phi + t_F\omega) \\
& + \mu r_MV_{FD} + t_MV_{FD}\omega) + V_{HP}(\mu\phi(V_{MD}(I_NV_{FM}(2r_F + t_F) + r_Mt_F(r_F + t_F)) + r_Ft_MV_{FD}(r_M + t_M)) + \mu^2(-V_{FD})(I_NV_{FM}(2r_M + t_M) + r_Mt_F(r_M + t_M)) - r_Ft_MV_{MD}\phi^2(r_F + t_F)) \\
& - \mu t_Ht_PV_{FM}(\eta - \omega)(t_MV_{FD} - t_FV_{MD})) + I_NV_{HP}(\mu r_MV_{FD} - r_FV_{MD}\phi)(\mu V_{FD}(r_M + t_M) - V_{MD}\phi(r_F + t_F)))) \\
A8 = & (l^2\mu^2V_{FM}^2(qV_{HP} + t_HV_{PN}) + l\mu V_{FM}(qV_{HP}(V_{MD}\phi(2r_F + t_F) + \mu V_{FD}(-2r_M - t_M)) + t_HV_{PN}(r_FV_{MD}\phi - \mu r_MV_{FD} \\
& + \eta t_FV_{MD} + \eta(-t_M)V_{FD})) + qV_{HP}(\mu r_MV_{FD} - r_FV_{MD}\phi)(\mu V_{FD}(r_M + t_M) - V_{MD}\phi(r_F + t_F)))(l(-ex_H\mu t_PV_{FM}(r_F\phi + t_F\omega) + V_{HP}\phi(\mu(I_NV_{FM}(2r_F + t_F) + r_Mt_F(r_F + t_F)) - r_Ft_M\phi(r_F + t_F)) \\
& + \mu t_Ft_Ht_PV_{FM}(\eta - \omega)) - I_Nr_FV_{HP}\phi(\mu V_{FD}(r_M + t_M) - V_{MD}\phi(r_F + t_F)) + I_NV_{HP}\phi(r_F + t_F)(r_FV_{MD}\phi - \mu r_MV_{FD})) - (l\mu V_{FM}(2qr_FV_{HP}\phi + qt_FV_{HP}\phi + r_Ft_HV_{PN}\phi + \eta t_Ft_HV_{PN}) + qV_{HP}\phi(\mu V_{FD}(-r_F(2r_M + t_M) - r_Mt_F) \\
& + 2r_FV_{MD}\phi(r_F + t_F)))(\mu l^2V_{FM}(-ex_H\mu t_PV_{FM} + \mu V_{HP}(I_NV_{FM} + t_F(r_M + t_M)) - t_MV_{HP}\phi(r_F + t_F)) + l(ex_H\mu t_PV_{FM}(-V_{MD}(r_F\phi + t_F\omega) \\
& + \mu r_MV_{FD} + t_MV_{FD}\omega) + V_{HP}(\mu\phi(V_{MD}(I_NV_{FM}(2r_F + t_F) + r_Mt_F(r_F + t_F)) + r_Ft_MV_{FD}(r_M + t_M)) + \mu^2(-V_{FD})(I_NV_{FM}(2r_M + t_M) + r_Mt_F(r_M + t_M)) - r_Ft_MV_{MD}\phi^2(r_F + t_F)) - \mu t_Ht_PV_{FM}(\eta - \omega)(t_MV_{FD} - t_FV_{MD})) \\
& + I_NV_{HP}(\mu r_MV_{FD} - r_FV_{MD}\phi)(\mu V_{FD}(r_M + t_M) - V_{MD}\phi(r_F + t_F)))
\end{aligned}
\tag{99}$$