dAy = kp\*y\*(1 + (1 + f)\*k\*A + (1 - f)\*k\*a) - km\*A\*(1 + (1 + f)\*k\*A + (1 - f)\*k\*a);

day = kp\*y\*(1 + (1 + f)\*k\*a + (1 - f)\*k\*A) - km\*a\*(1 + (1 + f)\*k\*a + (1 - f)\*k\*A);

dA = dAy - ki^2\*A\*a;

da = day - ki^2\*a\*A;

dy = c - dAy - day;

Print["Transform into \[Theta], \[CapitalDelta], z variables."];

sol = Solve[{A + a + y == z, A + a == \[Theta],

A - a == \[CapitalDelta]}, {A, a, y}][[1]]

sol0 = {\[CapitalDelta] -> 0};

dz = FullSimplify[(dA + da + dy) /. sol]

d\[Theta] = FullSimplify[(dA + da) /. sol]

d\[CapitalDelta] = FullSimplify[(dA - da) /. sol]

Print["Find stationary state."];

dz0 = FullSimplify[dz /. sol0]

d\[Theta]0 = FullSimplify[d\[Theta] /. sol0]

d\[CapitalDelta]0 = FullSimplify[d\[CapitalDelta] /. sol0]

sol1 = FullSimplify[Solve[{dz0 == 0, d\[Theta]0 == 0 }, {\[Theta], z}][[2]]]

Print["Substitute stationary state."]

dz1 = FullSimplify[dz /. sol1]

d\[Theta]1 = FullSimplify[d\[Theta] /. sol1]

d\[CapitalDelta]1 = FullSimplify[d\[CapitalDelta] /. sol1]

Print["Frank model with f = 1."];

FullSimplify[d\[CapitalDelta]1 /. {f -> 1, km -> 0}, k > 0 && ki > 0 && kp > 0]

Print["Frank model with f = -1."];

FullSimplify[d\[CapitalDelta]1 /. {f -> -1, km -> 0}, k > 0 && ki > 0 && kp > 0]