Equations of the motor ()

(1)

where is the angular velocity, is the viscous damping coefficient or dynamic Friction coefficient, is is the back electromotive force constant, is the is the static friction torque, is the torque load which they model in their paper for their quadcopter as but we already have this relationship empirically derived for the DJI Mavic pro as

= 4\*(10^-14)\*^3 + 8\*(10^-12)\*^2 + 3\*(10^-6)\* (2)

The dynamic relationships of the electrical part are not modeled, thus the electrical part is simply modeled as

(3)

Therefore, expressing in state space form as

where is a disturbance term, then you have

All the parameters you have them in matlab. The issue here is that you have two additional non-linear terms in the first equation as follows

These terms appear because the relationship between the Torque load and the angular velocity is non-linear. Therefore, you have a nonlinear system, what you can do is to linearize the relationship between torque load and angular velocity (equation 3) and replace the term in equation A. Another alternative is to consider the torque load as an additional input then you have