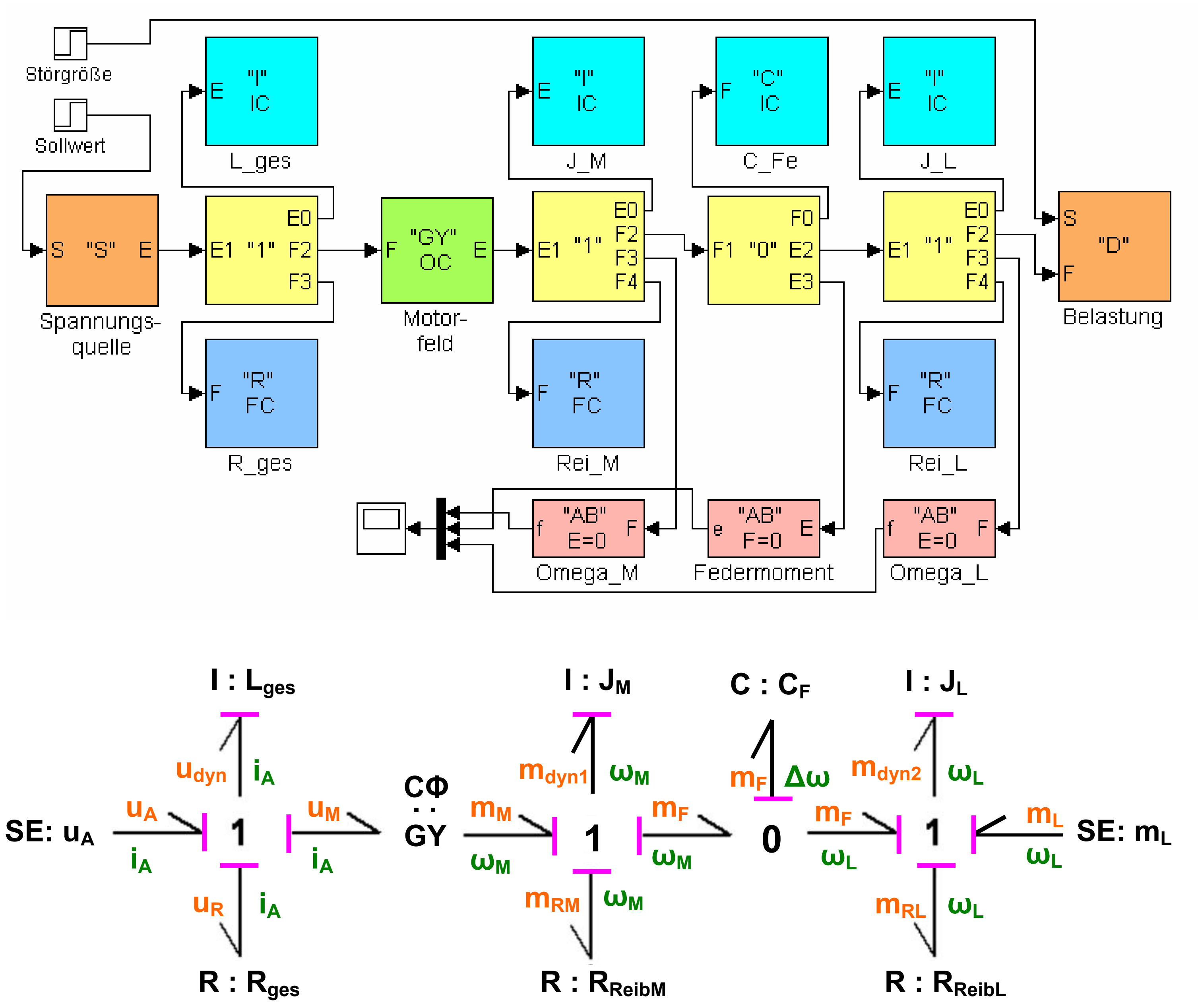
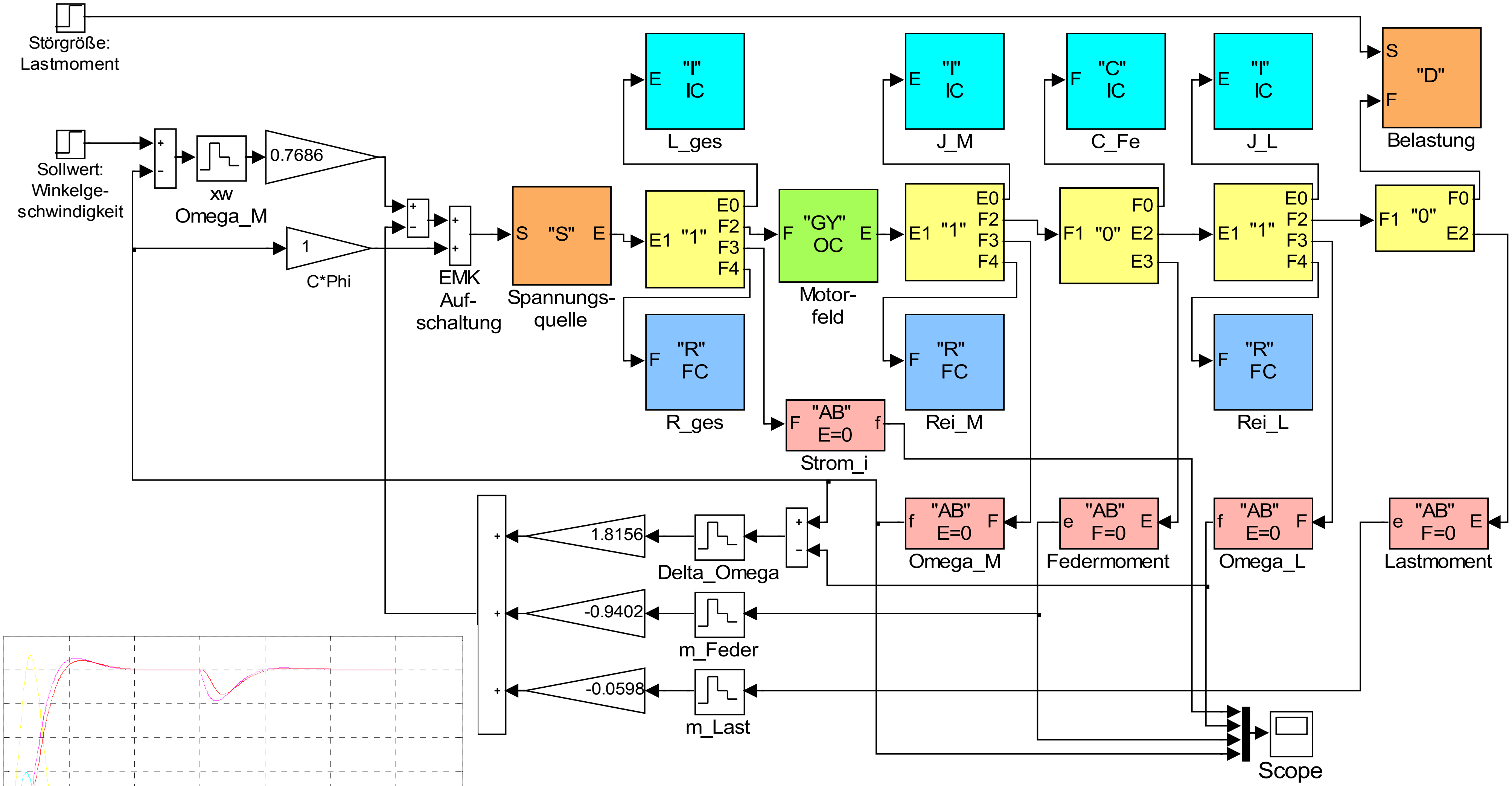
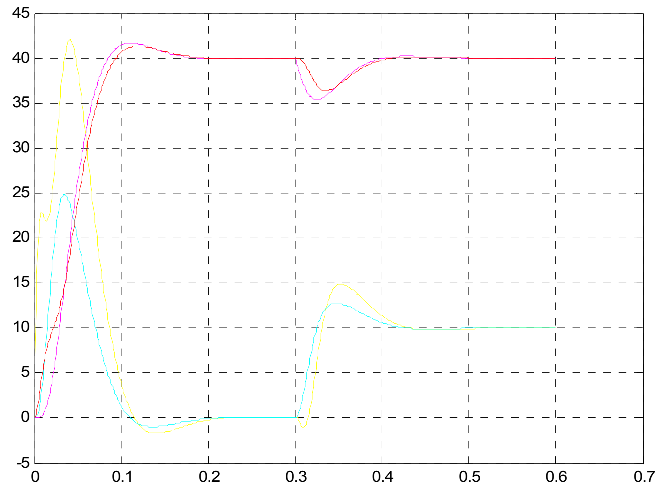


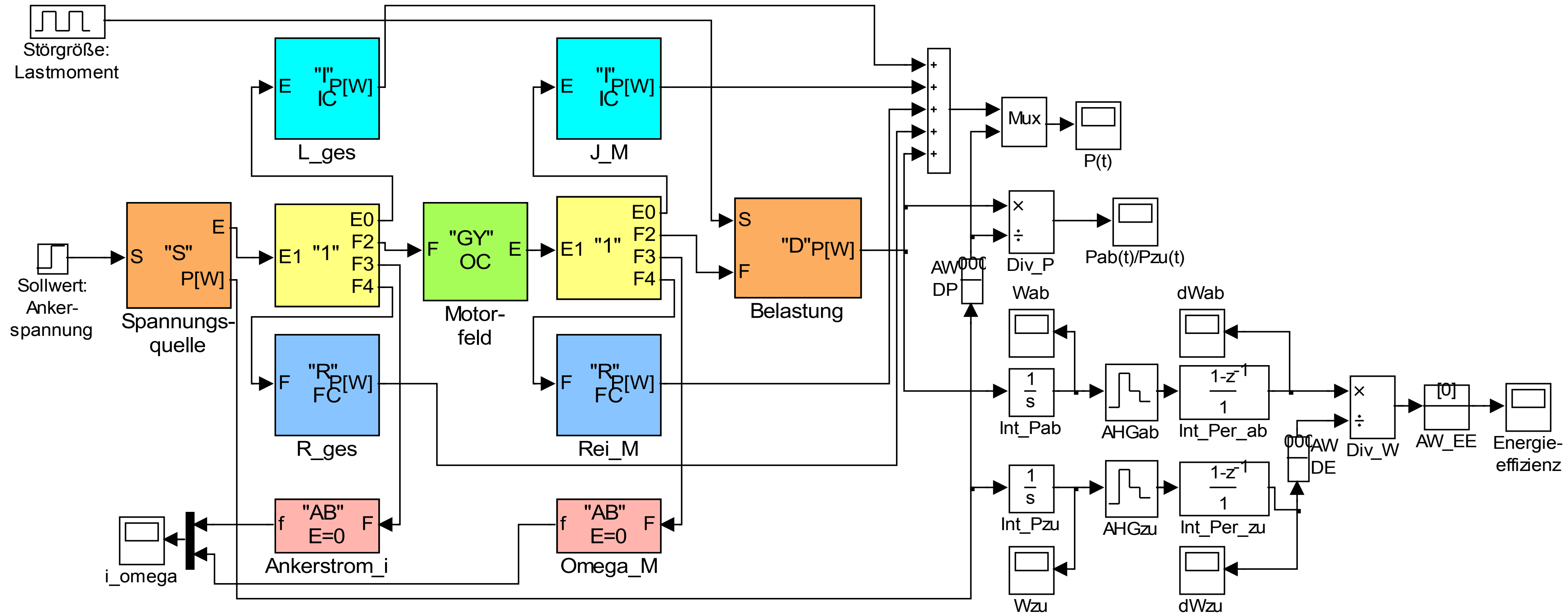
Rotating DC machine driving an elastic shaft

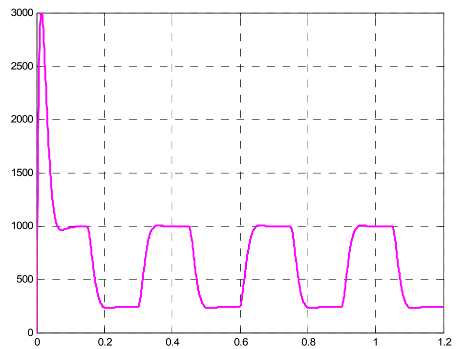




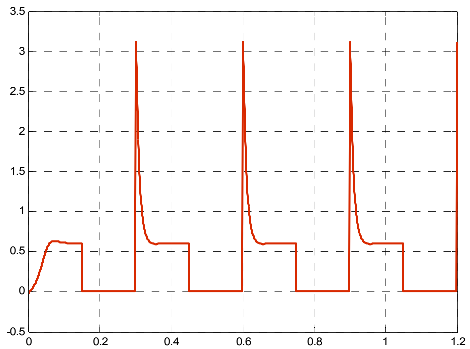
State control structure of a rotating DC machine driving an elastic shaft

[Set point step (t=0, Δ=40) and load step (t=0,3s, Δ=10), compensated e.m.f.]

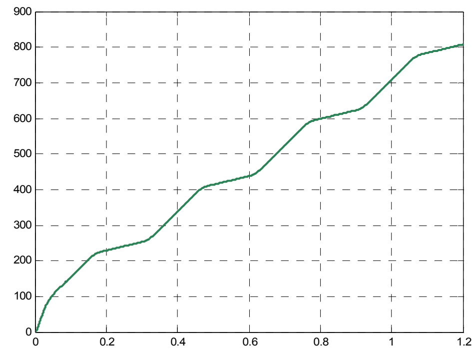




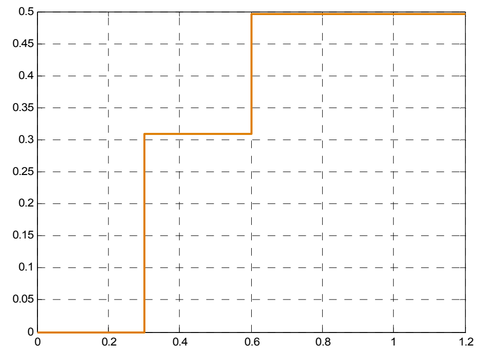
Power P(t)



Pab(t)/Pzu(t)

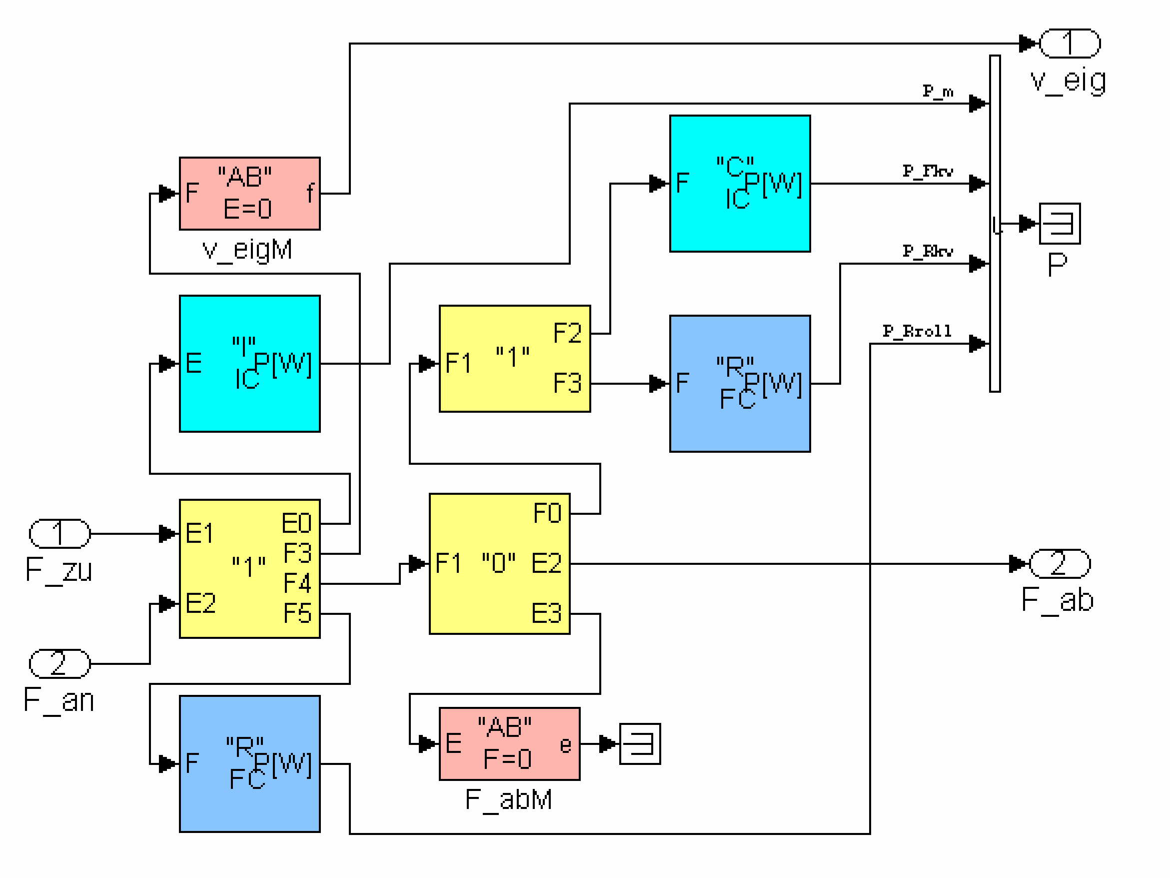


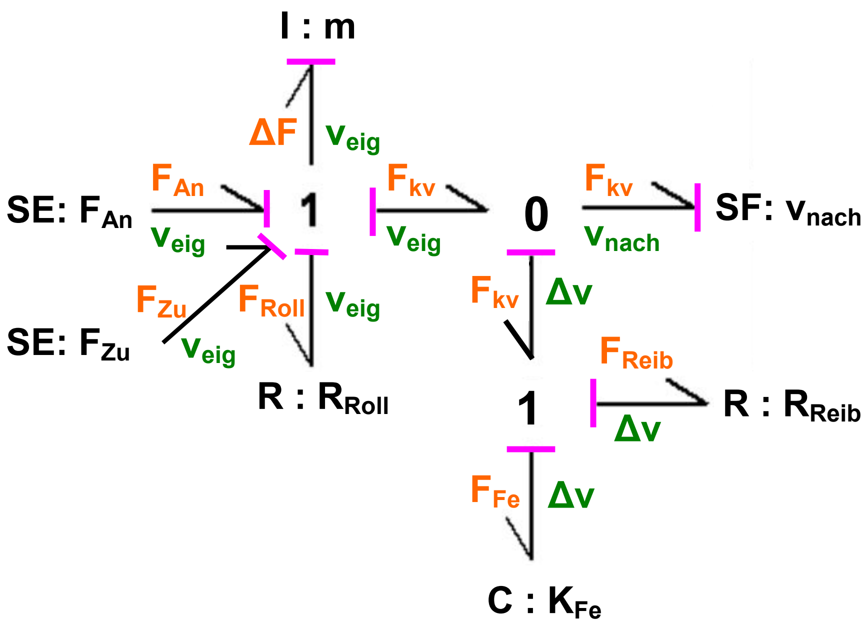
Energy Wzu



Energy efficiency ε

Energy efficiency, power and energy of a rotating DC machine driving a stiff shaft

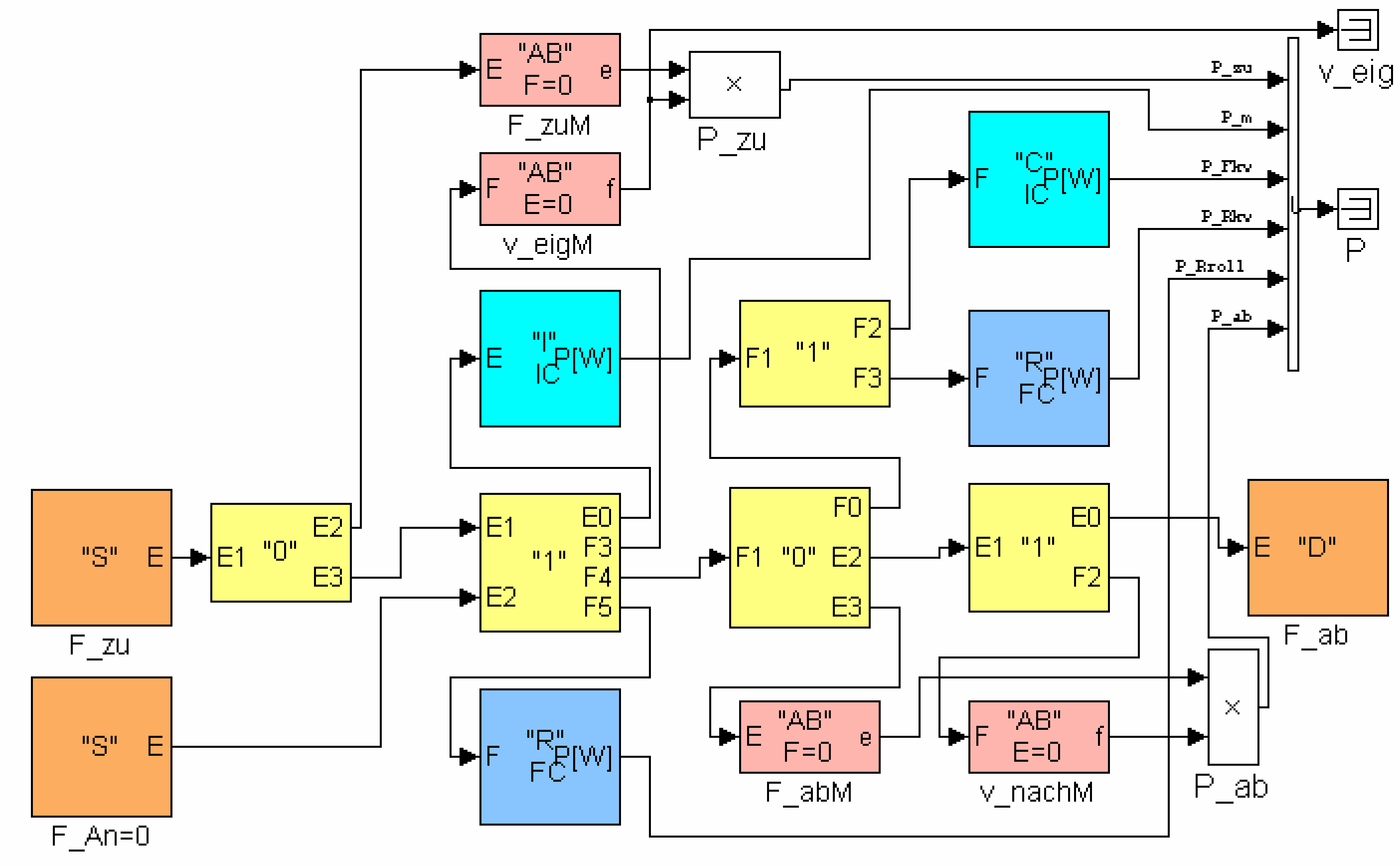




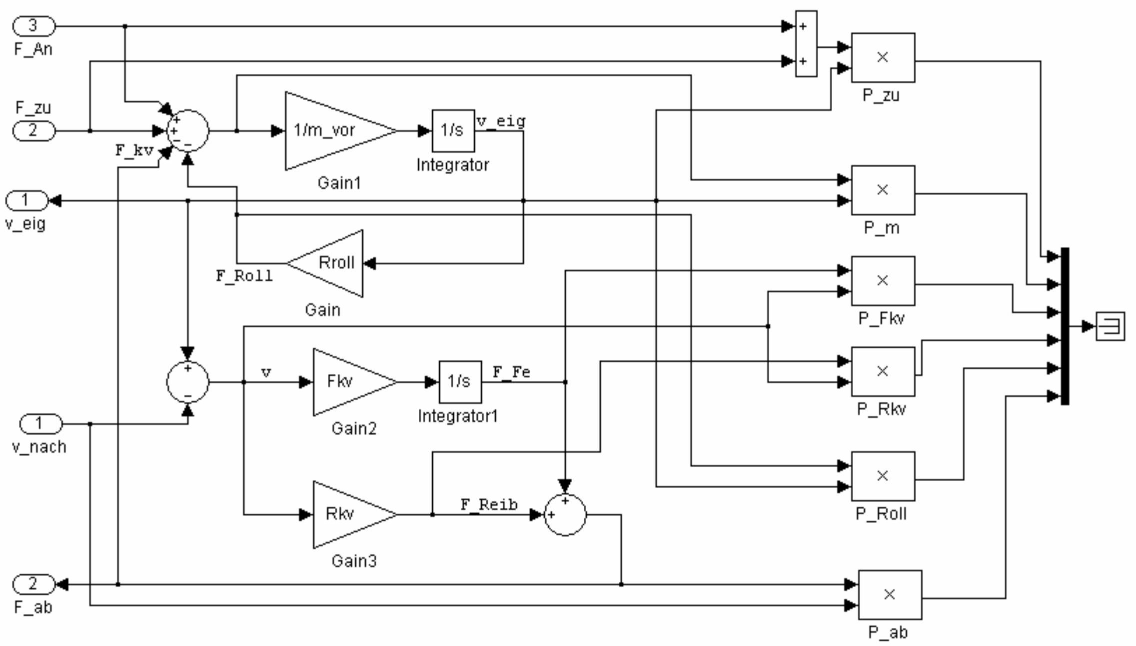
Kelvin-Voigt-Element ---- minimum form
(without v_{nach} - and F_{zu} - measurement as well as power sources resp. drains for Simulink)

Node eqations:

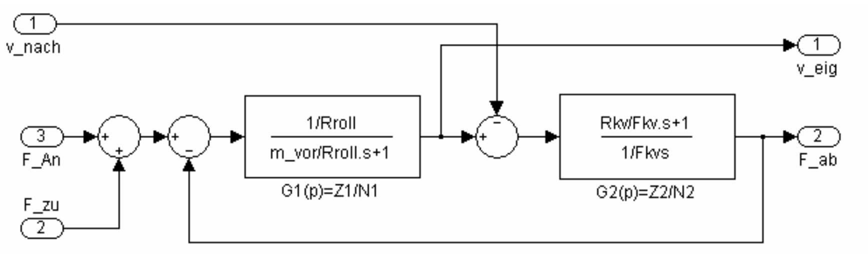
$$\Delta F = \left(F_{An} + F_{Zu}\right) - F_{Roll} - F_{kv}\,; \quad \Delta v = v_{eig} - v_{nach}\,; \quad F_{kv} = F_{Fe} + F_{Reib}$$



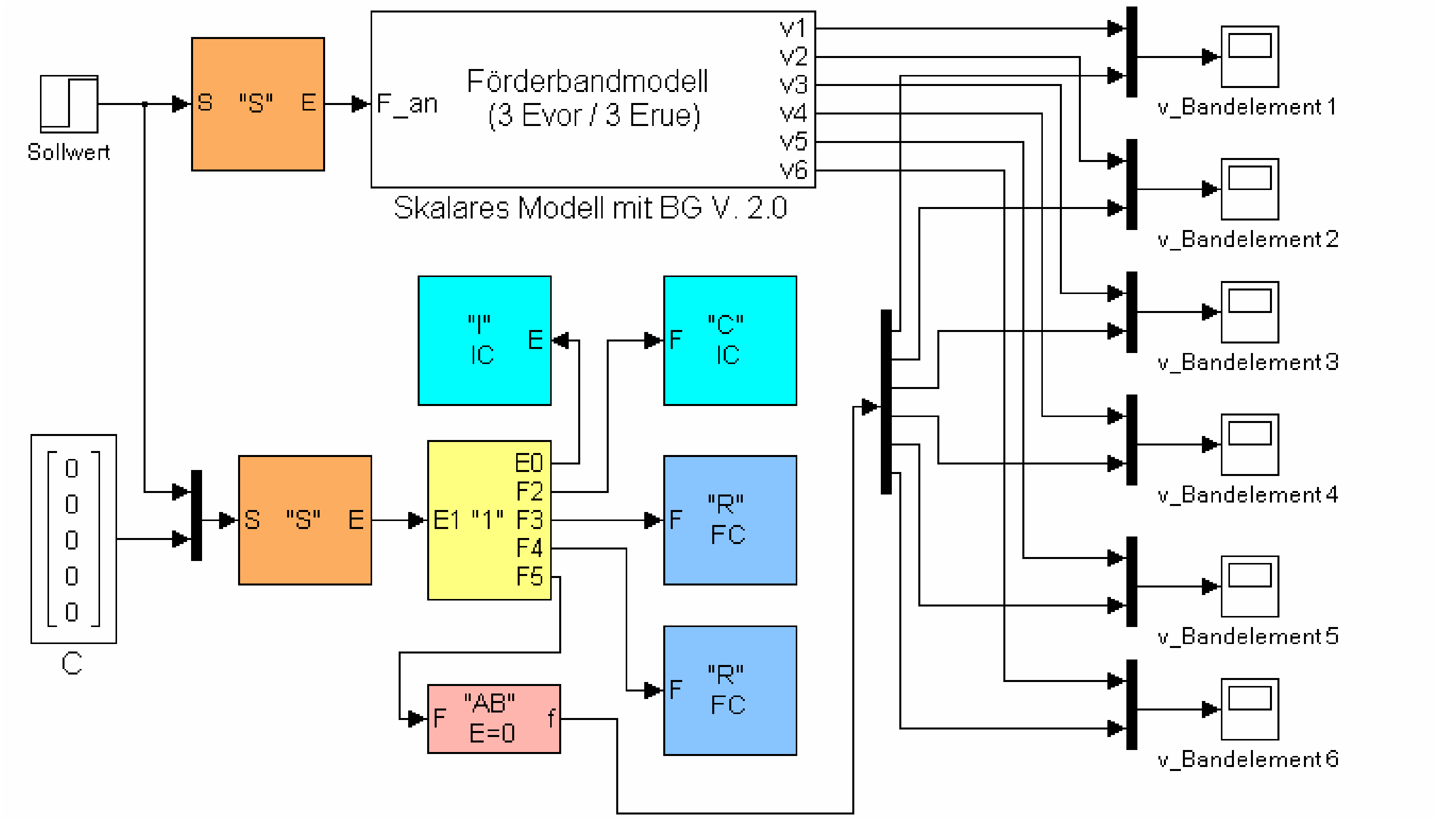
Kelvin-Voigt-Element with extended measurement for power computation (P_{zu} and P_{ab})



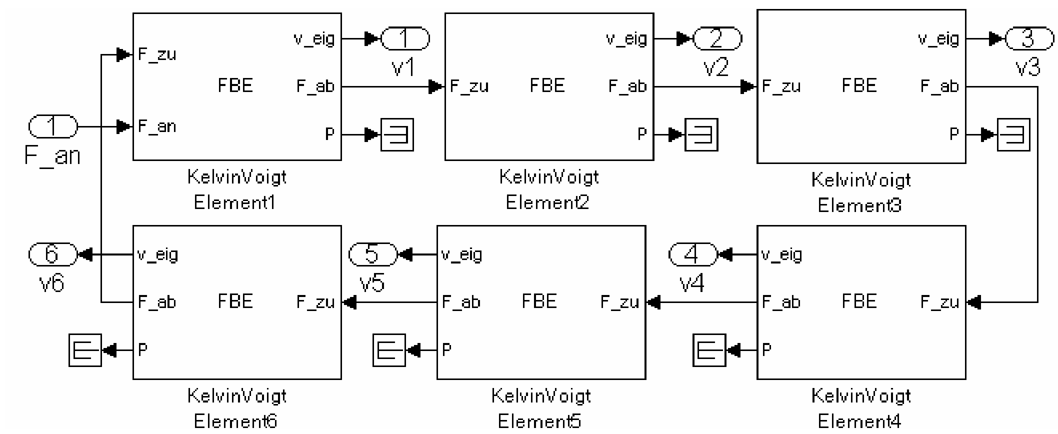
KVE: Signal Flow Diagram – for comparison



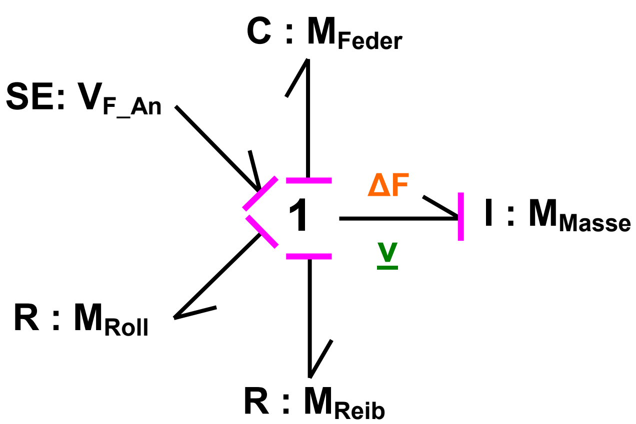
KVE: remodelled Signal Flow Diagram – for comparison



Belt conveyor: parallel connection of a vectorial and a scalar Bond Graph



Belt conveyor: structure of a scalar Bond Graph consisting of 6 Kelvin-Voigt-Elements



Belt conveyor: structure of a vectorial Bond Graph (number of elements fixed by matrices Mx)

Belt conveyor consisting of 3 KVE's per motion direction (on resp. back rolling)