Homework

A 4-story shear building has equal inter-story stiffness, mass and damping coefficients with values k=500 m =1.5 c = 0.2.

a) Calculate the 1st derivative of the first pole with respect to damage in level #1
b) Calculate the 2nd derivative

Let the building have one actuator in level#1 and sensors measuring displacement in levels 1 and 4 – assuming an output feedback operation compute:

c) The gain that shifts the first pole (and it's conjugate) towards the origin by 10%
d) The location of all the closed loop pole for the computed gain
e) The gain that is obtained when all the poles are placed in a LS sense with the first pole shifted 10% towards the origin and the others assigned their open loop positions.
f) The closed loop eigenstructure for the gain computed in (e)
g) The 1st derivative of the closed loop pole with respect to damage in level#1 for the gain computed in (e).

(If you need guidance look at file JD4)