wb1413
Multibody Dynamics B

Spring Term 2013, Thu 15:45-17:30, room EWI-CZ C), 4 ECTS credits.

Homework Assignment 2

Redo Assignment 1a–1d but now by using the systematic approach by means of the application of the Virtual Power Method and Lagrangian Multipliers. In doing this you will have to define among other things the constraints according to $D_k(x_i) = 0$ and differentiate these. You should take extra care in this differentiation. Be sure that your expressions are correct, preferably use symbolic software like the Symbolic Toolbox in Matlab. Address this item in your report.

Derive the equations of motion and the joint constraint equations and solve for the accelerations of the center of mass of the two bodies together with the Lagrange multipliers λ_k in the three initial condition cases from Assignment 1. Check your results and interpret the nature and value of the Lagrange Multipliers (this should also be in your report!).

Add a constraint to the system such that the right end of the second bar, point C, moves over a vertical line going through the origin (Note: the gravity still works horizontally). Calculate the the accelerations of the center of mass of the two bodies together with the Lagrange multipliers (and interpret the Langrange multipliers, in particular the new one) for the following two initial conditions:

e. Both bars vertical up and zero speeds.

f. Both bars vertical up and with an initial angular speed of $\omega = 30$ rpm CCW on bar 1.