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Abstract

Last year an identification method for mechanical manipulator models was presented (van de Molengraft, 8th BMoSaC). The basic idea of this method is the minimization of residuals on both the dynamic and measurement model. Three important features of the method are:
1. It is suitable for non–linear models. Most mechanical manipulators cannot accurately be described unless a non–linear model is used. Moreover, considering the model parameters as state variables, the degree of non–linearity is always increased.
2. It provides for estimates of the model parameters as well as the model variables. The estimates for positions, velocities and accelerations do not need to be derivatives of each other, nor need the parameter estimates to be constant.
3. It is deterministic. Generally the sum of all unmodelled phenomena will not behave like a stochastical quantity. That is why this method simply looks for the best fit to the given model structure.
It has been applied to the experimental XY–table, that was also discussed last year (Heeren, 8th BMoSaC). A three degrees of freedom model has been used for identification: two kinematic d.o.f. and one flexible d.o.f., representing the elastic deformation in the X–drive. The unknown inertia, stiffness and friction parameters in the model have been determined using measurements of the end–effector position and acceleration, the motor positions and motor currents. Next, a computed torque/PD controller based on the obtained model has been implemented, so as to judge the quality of the model. The control results have been compared with the results obtained with an ordinary PD controller.

In the presentation the various aspects of the application will be discussed and the results will be shown.