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Coupled Simulation of Multibody Systems and Elastic Structures. - In: J.A.C. Ambrosi3 and W.O. Schiehlen eds.: Advances in Computational Multibody Dynamics, IDMEC/IST Lisbon, Portugal, 1999.

**Abstract.** The coupled simulation of multibody systems (MBS) and elastic structures is an essential method to investigate the interaction between both systems. For example pantograph / catenary systems or the crossing of bridges by trains are typical applications where this simulation method is used intensively. Thereby the equations of motion of the MBS form a differential-algebraic equation which is combined with the partial differential equations describing the elastic structure. Both systems are coupled by geometrical contact conditions that result in additional algebraic equations. If the flexible systems do not fit into the common approach to handle the elastic deformation of bodies in a multibody system the method of finite elements (FEM) or finite differences (FDM) are suitable to discretize the PDE system in space and in time in two separate steps.

For the application of the coupled pantograph / catenary equipment, the pantograph system is represented by a multibody model whereas the catenary is a highly elastic structure. Therefore a model of an active high speed pantograph was tested in interaction with a catenary system, based on real assembly data. The results showed the advantage of the simulation considering the catenary in a direct way in relation to simplified approximations of the overhead-line dynamics.

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