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Development of shear and cross section deformable beam finite elements applied

By Karin Nachbagger

Trauner Verlag Mrz 2013, 2013. Taschenbuch. Book Condition: Neu. 20.8x14.6x cm. Neuware - The objective of the present thesis is the development of new beam finite elements for multibody dynamics systems that are capable of large deformations. Planar and spatial beam finite elements are presented which can reproduce axial, bending, shear and, in the three-dimensional case, torsional deformation and are based on the absolute nodal coordinate formulation (ANCF). The existing ANCF elements in the open literature showed significant problems regarding the formulation of elastic forces. Thus, the elastic forces are in the main focus of the present thesis. Different approaches for the work of elastic forces are presented. A continuum mechanics based formulation is discussed and extended in order to avoid Poisson locking. In addition, a structural mechanics based formulation of the elastic forces is discussed which includes a term accounting for cross section deformation. The investigation of several static and dynamic examples show high accuracy and high order of convergence. Therefore, the present elements have high potential for simulation of geometrically nonlinear problems arising from real-life multibody applications. 134 pp. Englisch.



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