

## The Absolute Coordinate Formulation with Reduced Strain and Stiffening

**Johannes Gerstmayr**, Hans Irschik

*Institute for Technical Mechanics, University of Linz, Linz, Austria*

The present work contributes to the field of multibody systems with respect to the absolute coordinate formulation (ACF) with a reduced expression of the strain energy. The ACF is known to be advantageous with respect to the description of constraint equations and the constant mass matrix. Absolute coordinates are used as unknowns, similar to nonlinear finite element methods. In the present work, a consistent linearization of the equations of motion with respect to small deformations but large rigid-body motions is performed. This formulation leads to a constant mass matrix while the nonlinear stiffness matrix is composed of the constant small strain stiffness matrix rotated by the underlying rigid body rotation. The equations of motion are derived for the case of a constrained multibody system and geometrical stiffening terms are introduced.

[View the extended summary](#)