

TREATMENT OF LOCKING ACROSS DISCRETIZATION TECHNIQUES

TRACK NUMBER 100 - ADVANCED DISCRETIZATION TECHNIQUES

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ABSTRACT

For problems in structural mechanics, locking is a well-investigated and a well-treated issue in the context of the finite element method (FEM). Based on the geometric characteristics, shear locking, membrane locking and trapezoidal locking can occur, while depending on the material properties, volumetric locking gets triggered. Recently, locking phenomena have been detected that only occur in nonlinear problems. There have been several ideas to alleviate the effects of locking, for instance, reduced integration techniques, the assumed natural strain method, the discrete strain gap method, the linked interpolation method, mixed methods, and many more. However, with emerging discretization techniques, this issue reappears, demanding further attention. In the recent decades, existing ideas from the framework of FEM have been extended, or novel approaches have been established to treat locking across these newly evolved discretization methods.

This mini-symposium aims to unify ideas and facilitate discussions on strategies explored to mitigate locking effects while using state-of-the-art discretization techniques to solve problems in small-strain and finite-strain solid and structural mechanics. This includes various topics like, but not restricted to, treatment of locking in the field of standard FEM, isogeometric analysis, scaled boundary FEM, virtual element method, meshless methods, collocation methods, lattice Boltzmann methods, machine learning-based approaches, and vector and matrix finite elements.

This mini-symposium is dedicated to Prof. Ekkehard Ramm on the occasion of his 85th birthday for his inspiring contributions in this field.