

## A New Finite Element Formulation Based on the Theory of a Cosserat Point

E.F.I. Boerner<sup>(1)</sup>, S. Loehnert<sup>(1)</sup>, M.B. Rubin<sup>(2)</sup>, P. Wriggers<sup>(1)</sup>

(1) *IBNM, University of Hanover, Hannover, Germany*

(2) *Technion, Israel Institute of Technology, Haifa, Israel*

The theory of Cosserat points is the basis of a finite element formulation, that recently was presented by NADLER & RUBIN (2003). First attempts have revealed, that this formulation is free of showing undesired locking or hourglassing-phenomena. It additionally shows excellent behaviour for any type of incompressible material, for large deformations and sensitive structures such as plates or shells. Within the theory of Cosserat points, the position vectors are described through director vectors. The special choice of the director vectors enables to split the deformation into homogeneous and inhomogeneous parts, which allows the use of stiffnesses that correspond to different deformation modes. Currently, analytical solutions for the calculation of stiffnesses for different modes are used. They are based on a parallelepiped shaped reference element, which is at present the major drawback to this formulation. This work gives insight to the possibilities of the Cosserat point element as well as first approaches on overcoming the difficulty of initial element geometries, that differ strongly from the shape of a parallelepiped.

[View the extended summary](#)