14th World Congress on Computational Mechanics (WCCM XIV)
8th European Congress on Computational Methods in Applied Science and Engineering (ECCOMAS 2020)
July 19–24, 2020, Paris, France

BEAMS: MODELS, NUMERICAL METHODS AND THEIR APPLICATIONS 900 – STRUCTURAL MECHANICS, DYNAMICS AND ENGINEERING

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Key words: Beams, structural dynamics, geometrical approaches, numerical methods

ABSTRACT

Since the seminal works of JC Simo and his geometrically exact finite-elements method on the Lie group $SO(3)$, many improvements in geometrical approaches for 3D beam models (Cosserat, Geometrically exact, etc.) and associated computational methods have resulted in a wide variety of applications, ranging from structural dynamics in space or underwater, flexible hoses and pipes in real-time virtual prototyping of assembly tasks, bio-mechanics of elongated animals, bio-inspired and soft robotics design and control, and even in physically-based methods in the computer graphics community. Today, all these communities have attained enough maturity to share their results and practices on the topic.

Topics of interest include, but are not limited to:

- Geometrical approaches to 3D beam problems in finite deformations
- Geometrically exact finite elements of beams in their various acceptations and flavors
- Beam models and associated numerical methods
- Precision and convergence of numerical methods for 3D beams, higher-order methods and locking phenomena
- Nonlinear stability and energy dissipation properties of numerical methods for beam elastodynamics
- Modeling of beam structures based on anisotropic or heterogeneous materials
- Beam models for cables and wire-ropes
- Computational efficiency in beam simulations for large scale systems or real-time applications