

ANUNCIO DE SEMINARIO

Flexible Multibody Systems Modelling : a Local Frame Approach using SE(3)

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Resumen:

In order to improve computational costs in the frame of flexible multibody system modelling, we propose a geometrically exact framework relying on a local frame description. Thanks to this framework, geometric non-linearities are strongly reduced for two reasons. Firstly, the equations of motion can be solved without introducing a global parametrization of the motion, which also leads to a naturally singularity-free description of large rotations. Secondly, the equations of motion are expressed in a local frame, both at position and rotation level, leading to intrinsic equations. Accordingly, these equations are insensitive to large amplitude motions, such that the geometric non-linearities are naturally filtered. The mathematical developments are carried out in a Lie group setting which, albeit more abstract than classical treatments, provides generic and powerful well established tools.

So far, several elements have been formulated in this framework: rigid body, kinematic joints and a flexible beam finite element. A shell finite element and a super-element are also under development. Some interesting numerical advantages are observed following the reduction of geometric non-linearities, e.g., the iteration matrix depends on relative motion within the elements only and is thus invariant under rigid body motions.