

Error estimation and space-time adaptivity for the isogeometric analysis of transient structural dynamics

Peng Yu¹, Susanne Claus¹, Sté'ephane Pierre Alain Bordas^{1,1}, Pierre Kerfriden¹,

^a*Institute of Mechanics and Advanced Materials, School of Engineering, Cardiff University*

^b*Facult'e des Sciences, de la Technologie et de la Communication, University of Luxembourg*

Abstract

This paper presents a new adaptive scheme for the error-controlled simulation of transient dynamics problem. We rely on spline bases for the higher-order spatial description of our kinematic fields. Local adaptivity is performed by employing a hierarchical T-mesh technology, in combination with geometry-independent field approximation. The Newmark algorithm is chosen to solve the semidiscrete equation of motion. We will present some simple local error estimates to drive the adaptivity, and show how we can ensure that the mechanical energy of conservative systems is preserved during the refinement process.

Keywords: isogeometric analysis, PHT splines, spacetime, error estimation, dynamics

*Corresponding author