Accepted Manuscript

Thermo-mechanical fracture study of inhomogeneous cracked solids by the extended isogeometric analysis method

H. Bayesteh, A. Afshar, S. Mohammdi

PII: S0997-7538(14)00185-5

DOI: 10.1016/j.euromechsol.2014.12.004

Reference: EJMSOL 3150

To appear in: *European Journal of Mechanics / A Solids*

Received Date: 6 January 2014

Revised Date: 21 September 2014

Accepted Date: 9 December 2014

Please cite this article as: Bayesteh, H., Afshar, A., Mohammdi, S., Thermo-mechanical fracture study of inhomogeneous cracked solids by the extended isogeometric analysis method, *European Journal of Mechanics / A Solids* (2015), doi: 10.1016/j.euromechsol.2014.12.004.

Thermo-mechanical fracture study of inhomogeneous cracked solids by the extended isogeometric analysis method

H. Bayesteh, A. Afshar, and S. Mohammdi[1]

School of Civil Engineering, University College of Engineering,

University of Tehran, Tehran, Iran.

ABSTRACT

The extended isogeometric analysis method (XIGA) is further developed to study fracture of homogeneous and inhomogeneous materials under mechanical and thermo-mechanical loadings. The domain of the problem is discretized by the knot spans of the isogeometric analysis (IGA) and the same basis functions used for constructing the geometry are employed to discretize the solution. In addition, crack face discontinuity and tip enrichment functions of the extended finite element method (XFEM) are incorporated into the NURBS basis functions of IGA in order to reproduce crack face displacement discontinuity and tip singularity of the stress field. The proper form of the interaction integral method in inhomogeneous materials and thermal conditions is employed to evaluate the mixed mode stress intensity factors. In order to assess the efficacy of the proposed approach, a number of problems with different configurations and loadings are analyzed and the results are verified by comparing with the reference values.

Keywords: *extended isogeometric analysis (XIGA), stress intensity factors, inhomogeneous material, thermo-mechanical loading*

[1] Corresponding author. Address: High Performance Computing Lab, School of Civil Engineering, University of Tehran, Tehran, Iran. Tel.: +98 21 6111 2258; fax: +98 21 6640 3808. E-mail address: smoham@ut.ac.ir.