

A LOCALIZED VERSION OF MORTAR METHOD FOR TREATMENT OF NONMATCHING INTERFACES: ALGORITHM DESCRIPTION

S. K. Youn¹, Y. U. Song¹ and K. C. Park²

¹ Department of Mechanical Engineering, Korea Advanced Institute of Science and Technology, 291 Daehak-ro, Yuseong-gu, Daejeon 305-701, Republic of Korea, skyoun@kaist.ac.kr

¹ Department of Mechanical Engineering, Korea Advanced Institute of Science and Technology, 291 Daehak-ro, Yuseong-gu, Daejeon 305-701, Republic of Korea, find3969@kaist.ac.kr

² Department of Aerospace Engineering Sciences and Center for Aerospace Structures, University of Colorado, Campus Box 429, Boulder, CO 80309, U.S.A., kcpark@Colorado.EDU

Key Words: Mortar Method, Localized Lagrange Multipliers, Nonmatching Interfaces, Linear and Angular Momentum Conservation.

The present work presents an updated version of an earlier work on the method of localized Lagrange multipliers as applied to construct the interface constraint functional for treating non-matching interfaces[1]. In so doing, first we address the comments made by Puso[2] regarding the involved frame construction and the increased number of Lagrange multipliers. Second, we avoid the usage of special interpolation schemes for the end nodes or boundary nodes that are characteristic of the mortar method [3, 4]. Third, we have developed a straightforward way of specializing the updated localized non-matching algorithm to either a localized version of the mortar method or master-slave type mortar method. The resulting method preserves both linear and angular momentum, with a balanced treatment of the interface sides without the preference of master-slave or mortar-nonmortar sides. A companion presentation presents the details of implementation and numerical experiments [5]

REFERENCES

- [1] Park KC, Rebel, G, Felippa CA. A simple algorithm for localized construction of non-matching structural interfaces. *Int. J. Numer. Meth. Engng.*, Vol. **53**, pp.2117-2142, 2002
- [2] Puso, MA. A 3D mortar method for solid mechanics. *Int. J. Numer. Meth. Engng.*, Vol. **59**, pp.315-336, 2004
- [3] Bernardi C, Maday Y, Patera AT. A new nonconforming approach to domain decomposition: the mortar element method. In Brezia H, Lions JL(eds), *Nonlinear Partial Differential Equations and Their Applications*. Pitman, and Wiley, New York, 1992.
- [4] Wohlmuth BI. A mortar finite element using dual spaces for the Lagrange multiplier. *SIAM J. Numer. Anal.*, Vol. **38**, pp.989-1012, 2000

- [5] Song YU, Youn SK, Park KC. A localized version of mortar method for treatment of nonmatching interfaces: Implementation and Performance Evaluation. *this proceedings*