SIMULATION OF STRAIN LOCALIZATION WITH AN ENRICHED GRADIENT-ENHANCED DAMAGE MODEL

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An implementation of the Generalized Finite Element Method [1] in the gradient-enhanced damage model by Peerlings et al. [2] is presented. The evolution of strain localization and damage is studied using a tension bar with reduced cross sectional area. The highly localized character of strain and non-local equivalent strain can be accurately described through suitable enrichments of the problem fields. Preliminary results shown in Figure 1 indicate that accurate load-displacement curves can be obtained with a fraction of the elements needed with a traditional finite element approach. Ongoing work and extensions to higher dimensions will be discussed.
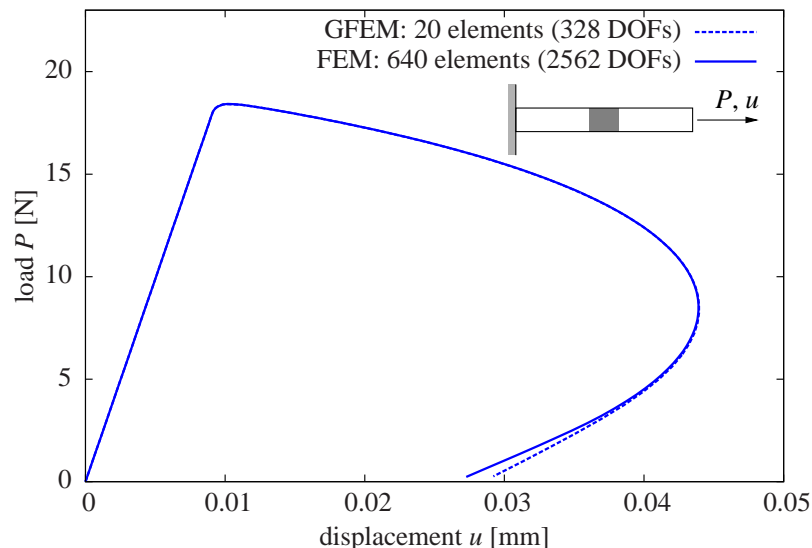

Figure 1: Load-displacement curve for a tension bar with reduced cross section.

References

[1] C. A. Duarte, I. Babuška, and J. T. Oden. Generalized finite element methods for three dimensional structural mechanics problems. *Computers and Structures*, 77:215–232, 2000.

[2] R. H. J. Peerlings, R. de Borst, W. A. M. Brekelmans, and J. H. P. de Vree. Gradient-enhanced damage for quasi-brittle materials. *International Journal for Numerical Methods in Engineering*, 39(19):3391–3403, 1996.