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APPLICATION OF AN ADAPTIVE STABLE GFEM FOR FRACTURE PROPAGATION IN PLAIN CONCRETE

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Generalized finite element method (GFEM) has proven itself as a tool of choice over the conventional FEM in fracture analysis due to enhanced computational efficiency as well as allowing cracks to propagate independently from the domain mesh – Thanks to the use of enrichments chosen based on the *a priori* knowledge of the solution behavior. With the many versions of the method's formulations in the literature, their stability issues, compared to the standard FEM, are often unresolved. This paper presents the use of an adaptive stable GFEM to plain concrete fracture propagation. Having verified the formulation's accuracy and stability based on the Linear Elastic Fracture Mechanics in previous studies [1] and its two-scale (global-local) version on concrete fracture [2], the present work seeks to verify its capabilities in capturing the size effect behavior in concrete. A series of fracture simulations in geometrically similar experimental concrete beams, under a 3-point bending regime, is presented based on a bilinear cohesive model. In addition to the GFEM's agreement with the experimental load-displacement response and the effect of the initial notch-to-depth ratio, the simulation successfully captures the size effect behavior when presented on the popular Type II Size Effect plot [3] – the so-called Bažant's law.

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