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A posteriori performance-based comparison of three new path-following constraints for damage analysis of quasi-brittle materials. (English) [Zbl 1440.74345](#)

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Summary: Using a path-following algorithm to analyze a quasi-static nonlinear structural problem involves selecting an appropriate constraint function. This function should improve the desired performance targets of the path-following algorithm such as robustness, speed, accuracy, and smoothness. In order to be able to draw a fair objective selection of a constraint function, it is necessary to collect adequate constraint equations as well as to define the performance of nonlinear methods. In this paper, three new path-following constraints applicable for damage analysis of quasi-brittle materials are proposed. Additionally, performance criteria and their numerical measures for a posteriori assessment of robustness, smoothness, accuracy, and speed of solving nonlinear problems by a path-following method are proposed. Based on the proposed criteria, the performance of the three new constraints and two existing ones is compared for two example problems. As a result, the performance measures are shown to possess an ability to clearly explore the strengths of each constraint. They establish a firm basis for the assessment of not only path-following methods but also other methods for solving nonlinear structural problems.

MSC:

[74R05](#) Brittle damage

Keywords:

[performance criterion](#); [path-following method](#); [quasi-brittle materials](#); [snap-back](#)

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