**An Improved Local Damage Model with Alternative Equivalent Strain for Quasi-Brittle Materials**

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**Abstract.** This paper presents an improved local damage model with an alternative equivalent strain for quasi-brittle materials. The state of material is represented by a damage parameter *d* in the range [0,1] to describe the degradation from intactness (*d* = 0) to complete failure (*d* = 1). Here, the fracture energy and the element characteristic length into the calculation of the damage parameter. This improvement helps to mitigate the issue of mesh-dependency being inherent to the local continuum damage model, while the advantage of low computational cost remains. It was pointed out in the literature that the evaluation of equivalent strain may affect the prediction of the numerical model on the growth of the damage zone, especially when mixed-mode loadings are involved. Therefore, for better modeling the failure behavior under mixed-mode loadings of quasi-brittle materials such as concrete and limestone, in which compressive strength is higher than tensile strength, an alternative evaluation of equivalent strain based on the Ottosen criterion is adopted. The accuracy and efficiency of the proposed approach are demonstrated via comparison with existing experimental data and other numerical models available in the literature …

**Keywords:** Improved local damage model, Quasi-brittle material, Equivalent strain, Ottosen criterion.