

A GRADIENT-EXTENDED ANISOTROPIC DAMAGE AND FRACTURE MODEL BASED ON A SECOND ORDER DAMAGE TENSOR

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Keywords: *anisotropic damage, fracture, gradient-extension, micromorphic approach*

The presented anisotropic damage and fracture model utilizes a damage tensor of second order and the elastic part of the free energy is constructed in such a way that the damage growth criterion, cf. Wulfinghoff et al. [1], is satisfied. This criterion ensures that during a damage process the stiffness of the material decreases in any direction, or to be more precise that the stiffness can not increase in any direction during a damage process. Mesh objectivity is achieved by a certain gradient extension, called the micromorphic approach according to the work of Forest [2]. The micromorphic approach introduces an internal length which incorporates the effect of the microstructure of the material. For the local counterpart of the additionally introduced micromorphic damage variable the accumulated damage (damage hardening variable) is chosen. With the presented model diffuse damage (distributed damage) as well as localized damage (fracture) can be represented. The whole formulation is tested with several numerical examples which include localized damage as well as diffuse damage.

REFERENCES

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