

عنوان مقاله:

Substructure Model for Concrete Behavior Simulation under Cyclic Multiaxial Loading

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خلاصه مقاله:

This paper proposes a framework for the constitutive model based on the semi-micromechanical aspects of plasticity, including damage progress for simulating behavior of concrete under multiaxial loading. This model is aimed to be used in plastic and fracture analysis of both regular and reinforced concrete structures, for the framework of sample plane crack approach. This model uses multilaminated framework with sub-loading surface to provide isotropic and kinematics hardening/softening in the ascending/descending branches of loading. In multilaminated framework a relation between stress/strain and yield function on planes of various orientation is defined and stress/strain path history for each plane is kept for a sequence of future analysis. Four basic stress states including compression-shear with increase/decrease in the compression/shear ratio, tension-shear and pure compression are defined and the constitutive law for each plane is derived from the most influenced combination of stress states. With using sub-loading aspect of the surface, the kinematics and isotropic hardening are applied to the model to make it capable of simulating the behavior under any stress path, such as cyclic loading in the ascending/descending branch of loading. Based on the experimental results of the literature, the model parameters are calibrated. The model results under monotonic loading and also different states of cyclic loadings such as uniaxial compression, tension, alternate compression tension, shear and triaxial compression are compared with experimental results that shows the capability of the model.

کلمات کلیدی:

Concrete, Multilaminate, Microplane, Elastoplastic, FEM, Substructure, fracture

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