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Mechanical Model for Dynamic Behavior of Concrete Under Impact Loading[1] YUANXIANG SUN, State Key Laboratory of Explosion Science and Technology, Beijing Institute of Technology,China — Concrete is a geo-material which is used substantively in the civil building and military safeguard. One coupled model of damage and plasticity to describe the complex behavior of concrete subjected to impact loading is proposed in this research work. The concrete is assumed as homogeneous continuum with pre-existing micro-cracks and micro-voids. Damage to concrete is caused due to micro-crack nucleation, growth and coalescence, and defined as the probability of fracture at a given crack density. It induces a decrease of strength and stiffness of concrete. Compaction of concrete is physically a collapse of the material voids. It produces the plastic strain in the concrete and, at the same time, an increase of the bulk modulus. In terms of crack growth model, micro-cracks are activated, and begin to propagate gradually. When crack density reaches a critical value, concrete takes place the smashing destroy. The model parameters for mortar are determined using plate impact experiment with uni-axial strain state. Comparison with the test results shows that the proposed model can give consistent prediction of the impact behavior of concrete. The proposed model may be used to design and analysis of concrete structures under impact and shock loading.

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