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EIGENEROSION APPROACH FOR FRACTURE MODELING OF CONCRETE UNDER IMPACT LOAD USING THE MATERIAL POINT METHOD

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The Material Point Method (MPM) is an alternative approach to the Finite Element Method (FEM) when the latter fails due to highly distorted elements at large local deformations. The domain is discretized using material points. The material points move over a background mesh carrying all material properties. Concrete structural elements under impact could be penetrated, which makes the MPM a preferable choice over the FEM. A fracture model is needed to describe crack propagation. Among different approaches, the eigenerosion approach [1] is a suitable formulation for this purpose.

In this study, a method to simulate the fracture of reinforced concrete material under impact load is developed. The reinforcement bars are discretized using truss finite elements and coupled with the MPM. The eigenerosion fracture model is implemented and adapted to the MPM. In order to achieve realistic predictions of the crack kinematics, the concept of representative crack elements is applied to the eigenerosion approach [2].

REFERENCES

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