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A continuous – discontinuous approach to simulate physical degradation processes in porous media. (English) Zbl 1202.74158

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Summary: A macroscopic framework for the simulation of physical degradation processes in quasi-brittle porous materials is proposed. The framework employs the partition of unity (PU) concept and introduces a cohesive zone model, capturing the entire failure process starting from the growth and coalescence of micro-defects until the formation of macro-cracks. The framework incorporates the interaction between the failure process and the heat and mass transfer in the porous medium. As an example, physical degradation of an outside render is studied. The analysis illustrates that both material and interface failure can be investigated with this formulation. Depending on the boundary conditions, either one dominant crack or a network of small cracks is formed.

MSC:

74R99	Fracture and damage
74F10	Fluid-solid interactions (including aero- and hydro-elasticity, porosity, etc.)
74F05	Thermal effects in solid mechanics
80A20	Heat and mass transfer, heat flow (MSC2010)

Keywords:

failure; damage; fracture; cohesive zone model; PU; X-FEM; heat transfer; mass transfer; multi-physics; continuous; discontinuous framework

Software:

TOUGH

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