

PHASE FIELD MODEL FOR SIMULATING FRACTURE OF ICE

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Keywords: *phase field model, fracture, ice, application*

In the last decade, the phase field model has been established to simulate crack nucleation as well as crack propagation. In this variational approach the physical discontinuity of a crack is modeled by a continuous field variable that distinguishes between intact and broken material.

The phase field model has been recently extended to viscoelastic materials in various ways, in which the rate dependent response of viscoelastic materials are taken into account.

We propose a viscoelastic fracture phase field model and apply it to simulate the fracture in ice shelves. Thereby we consider the viscoelastic rheology of ice, which can be represented by a Maxwell model and is often neglected in ice fracture studies.

The numerical examples of this contribution are implemented and conducted in the finite element software FEniCS and data mimic typical situations in Antarctic and Greenland ice shelves.

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