Optimization of Phase-Field Damage Evolution

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Within this talk, we will address optimization problems governed by time-discrete phase-field damage processes. The presence of an irreversibility of the fracture growth gives rise to a nonsmooth system of equations. To derive optimality conditions we introduce an additional regularization and show that the resulting optimization problem is well-posed.

To tackle discretization errors, as well as convergence in the limit of the irreversibility penalty, an improved differentiability result is shown for the time discrete regularized damage process.

Based upon this, we can show that certain local minimizers of the optimization problem can be approximated by the proposed penalty approach. Further, we will give a short discussion of resulting discretization error estimates.