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PHASE FIELD FOR NONSTANDARD DAMAGE MODEL FOR CONCRETE

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Abstract. The phase field theory, originally formulated for the evolution of dual phase boundary and then extended to the resolution of multiphase problems, is also one of the most powerful smeared crack approaches for dealing with the computational modeling of solid failures. The evolution of the material system is then characterized by two energetic principles: the global stability condition and the energy balance between stored and dissipated energies with the work of external loading. Rate-independent generalized standard materials are endowed with such structure whereas the existence of such energetic structure is not so apparent in materials with non-associated flow rule. In this work, we consider a phase field damage model for concrete derived from the energetic formulation with a dissipation state dependent potential, which allows the description of damage evolutions that do not follow the normality rule. After introducing the incremental minimization problem consistent with such formulation, the discrete version of the stability condition, together with lower and upper a-priori energy bounds met by the energetic solution, will be deduced. These results are fundamental for the analysis of the formulation and for the numerical resolution of the incremental minimization.