

1135-74-414

Eyad Said* (esaid1@lsu.edu), Baton Rouge, LA 70803, **Robert Lipton** (lipton@math.lsu.edu), Baton Rouge, LA 70803, and **Prashant Jha** (jha@math.lsu.edu), Baton Rouge, LA 70803. *Free damage propagation with memory.*

We introduce a simple model for free damage propagation based on non-local potentials. Constraints on material compressibility are encoded as well as damage history. We work within the small deformation setting and the model is developed using a state based peridynamic formulation. The resulting evolution is shown to be well posed. At each instant of the evolution we identify the damage set. On this set the local strain has exceeded critical values either for tensile or hydrostatic strain and damage has occurred. For this model the damage set is nondecreasing with time and associated with damage variables defined at each point in the body. We show that energy balance holds for this evolution. Here the space - time volume of the damaging set goes to zero at a rate that is linear with the length scale of non-local interaction. For differentiable displacements away from the damage set we show that the nonlocal model converges to the linear elastic model. (Received September 01, 2017)