1125-74-2251 **Robert Lipton** and **Eyad Said***, Department Of Mathematics, Baton Rouge, LA. *Damage Modeling using Dissipation Potentials for State Based Peridynamic Fracture Evolution.*

We formulate a non-local cohesive model for calculating the deformation inside a cracking body. The physical properties in this model include elastic and softening behavior and are assigned at each point. Three-point interaction is also included in this model by means of the hydrostatic stress. We work within the small deformation setting and use the peridynamic formulation. The strains are calculated as difference quotients and the constitutive relation is non-local cohesive law relating the strain to the force that is motivated by Lennard-Jones model. At each instant of the evolution we identify a process zone where strains lie above a threshold value. Perturbation analysis shows that jump discontinuities within the process zone can become unstable and grow as enough strains in the peridynamic neighborhood exceeds the threshold. We derive an explicit inequality that shows that the size of the process zone is controlled by the ratio given by the length scale of non-local interaction divided by the characteristic dimension of the sample. We conclude by calibrating the model to the physical properties of the body. (Received September 20, 2016)