Modeling of Solids Using Discrete Elements Bonded with Co-rotational Beam Elements

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As the Discrete Element Method (DEM) becomes more widely used and as computer resources become faster and larger, the ability to represent inter-particle behavior needs to be enhanced in order to more accurately replicate macroscopic material behavior. This work documents the efforts to implement an inter-particle bonding scheme into the DEM code DMC (Distinct-Motion Code, developed at Sandia National Laboratories) that utilizes a co-rotational beam element formulation as the bonding element. The bonding scheme allows for the transmission of axial loads, moments, and transverse shear loads between particles. This connection scheme is introduced in order to aid in more accurately represent material in a continuum state using discrete elements. Results from validation simulations will be shown that compare the formulation to analytical solutions.