Cohesive Zones to Model Bonding in Granular Material using MPM

The modeling of granular materials was an early application of the Material Point Method due to the method’s ability to treat contact between bodies. Here, we further demonstrate that capability using new methods for treating contact and include inter-granular bonding. Bonds between grains in contact are represented using cohesive zones. The approach is described, and example calculations are carried out in two and three dimensions to demonstrate the capability. We show the ability to influence both the stiffness and strength of bonded granular materials, thereby improving our representation of "digital rocks".