SOLID MECHANICS
FLOW OF POWDER AND BULK SOLIDS

GeoEE 500

1. **Continuum Approaches**

   1.1. Stress Analysis

      1.1.1. Stresses at a Point

      1.1.2. Stress Transformation Equations

      1.1.3. 2-D Stress Transformation Equations

      1.1.4. Mohr's Circle

         1.1.4.1. Concept of Poles

         1.1.4.2. Principal Stresses

   1.2. Equilibrium Equations

      1.2.1. Cartesian Coordianates

      1.2.2. Cylindrical Coordinates

   1.3. Strains and Compatability Equations

   1.4. Constitutive Relations

      1.4.1. Elastic

      1.4.2. Plastic

   1.5. Sample Solutions

      1.5.1. Elastic – Thick-walled Cylinder

      1.5.2. Plastic – Expansion of a Cylindrical Cavity

      1.5.3. Limit Plasticity

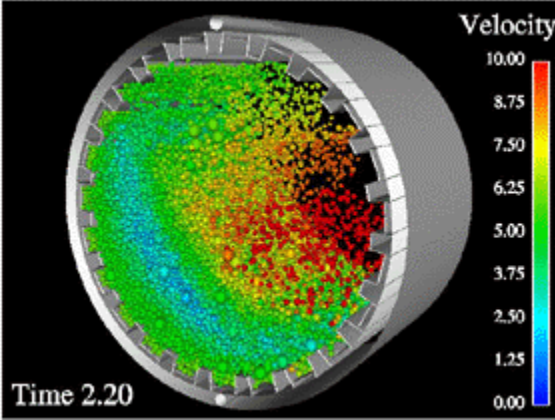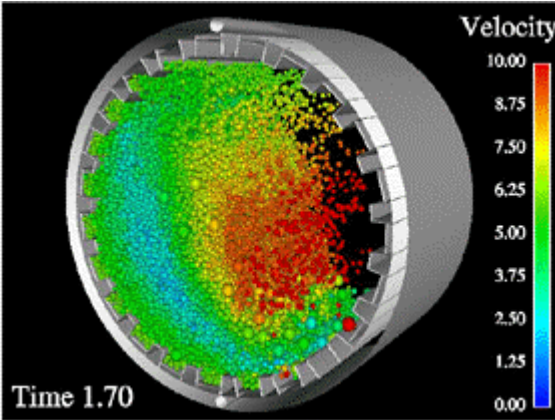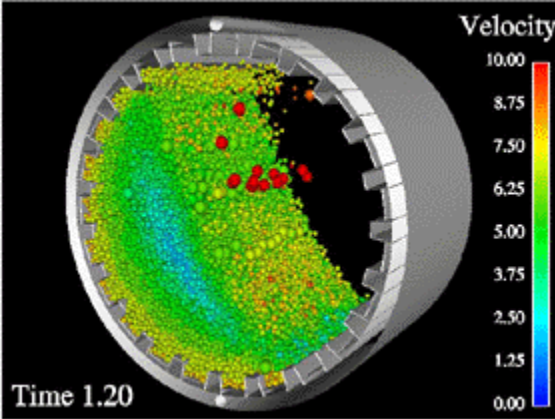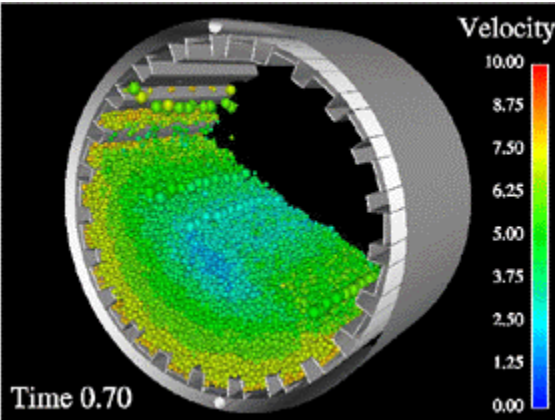   1.5.3.1. Upper Bound Solution

         1.5.3.2. Lower Bound Solution

2. **Discontinuum Approaches**

   2.1. Discrete Element – Dynamic Relaxation Methods

      2.1.1. Single Degree-of-freedom System

Ball Milling Example – Discrete Element Codes

(http://www.cmis.csiro.au/cfd/dem/ballmill_3D/index.htm)

2.1.2.