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TUTORIAL FOR THE EXAMPLE: A SMALL MULTI-BODY

SYSTEM

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In this example a small multi-body system was simulated to demonstrate the 3D FEMDEM code's capability of modelling arbitrary shaped bodies impacting with internal stress wave propagation. The reader is invited to load the GID files from which the example below is generated and to view the animated result which is visible in the *MOVIES* folder.

This small system consists of two objects drawn by CAD (a sphere and a cube), and two identical rock geometries obtained from a shape library of geometries captured in our laboratory from pieces of rock aggregate using a laser scanner. These rock geometries (seen as GID NURB surfaces in Figure 1a) were chosen from the shape library in VGW (see \VGW_QMULIC\DEV\P3D and Publications folder).
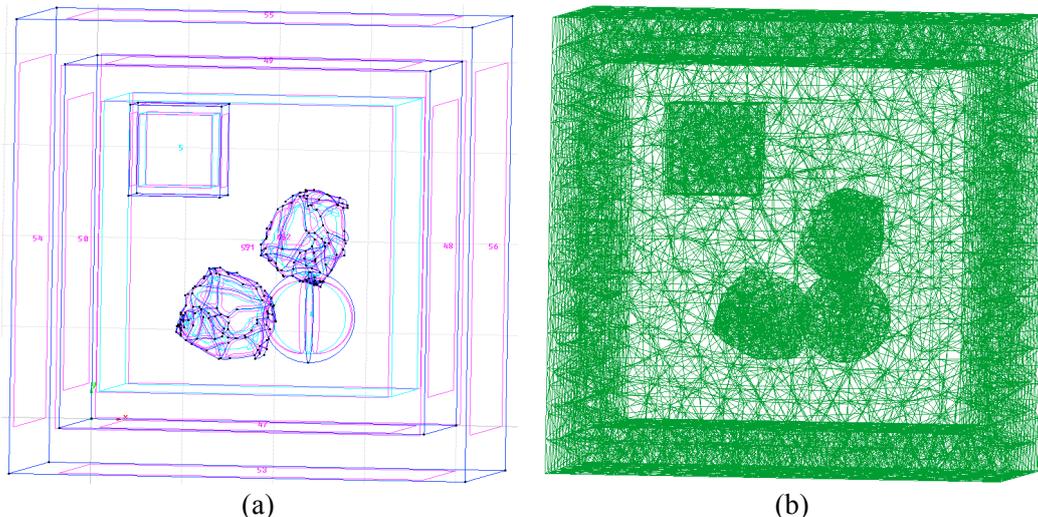

(a)   (b)
Figure 1 Snapshots of multi-body system from GID (a) geometry   (b) elements

The purpose of this short tutorial is to show you the steps you will need to follow to create the input file .Y3D for the Y3D program (see \VGW_QMULIC\DEV\Y3D).
1. A laser scanner was used to scan real rocks and generate surface meshes (.stl).
2. The surface meshes were imported into GID (for details, see http://www.gidhome.com/. We recommend spending time familiarising yourself with the versatile range of options for building primitives and meshes with GID). Using GID, the sphere, cube, and box were drawn.
3. A generic template for collating all the input information (B3D.gid) has been set up to work along side GID to store all the assigned boundary conditions and material properties. At this stage, while working in the GID environment, you have chance to change material properties, particle centre initial positions, nodal initial velocity, etc through GID acting as a GUI (graphics user interface).
4. As Y3D has improved capability and handles quadratic tetrahedral meshes, we take advantage of GID's ability to generate quadratic tetrahedral elements.

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5. After obtaining the quadratic elements, we can export correctly formatted meshes with the chosen property and boundary information by Clicking Files->Export->Calculation file. The exported completed template file ending in .B3D should have a file name chosen to convey the type of problem. In this case it is simply Multibody.B3D.
6. As there are a few settings that Y3D requires that that could not be assigned from within GID, a translator program, GID_gen, takes as input the .B3D file, requests the final problem definition information before outputting the .Y3D file needed for input to Y3D.
7. By double clicking GenInputY3D.bat, the input file Multibody.Y3D will be produced.