

# Visualizations of a Nuclear Pressure Vessel

*J. Leng, L. Margetts, I. M. Smith from the University of Manchester  
R. Crouch from the University of Durham*

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The context for this paper is important. It contributes to a debate within the computational engineering community regarding computational methods. The nuclear pressure vessel is a problem that has been in that domain for some time. All solutions to this problem have focussed on numerically precise solution which has meant reducing the data to a small 2D sample. This is the first time a full 3D solution has been obtained.

Using finite element analysis the numerically most precise way to obtain this is to use a direct solver. The direct solver while being precise uses large amounts of memory and so when applied to this data only a small 2D sub-set from the side of the vessel has been used. The iterative solver is less precise but can be used in parallel simulations to find a full 3D solution.

The important features of the visualizations for this work were:

1. Together the images show the complex 3D shape of the pressure vessel and the size of the underlying mesh.
2. Figure 2 shows that the deformation modelled in the simulation is not the same across the whole pressure vessel. The side of the pressure vessel deforms differently to the top and the bottom. Simulations using the direct solver have just modelled a 2D section of the side of the vessel.
3. Figure 3 also shows that the 3D data has asymmetry and that the resulting deformation also has asymmetry.
4. The results were to be published in proceedings that are not colour so that the images should convey all the necessary information in grey scale.

The key figure is Figure 2. This does not use legends to show the colour map used. Instead the colour maps are described in the text of the paper. This reduces clutter and allows better comparison of the sub-figures. However it was also because the paper template for this conference was in word and word does not rescale images well and made the text difficult to read. Figure 2 d uses a LIC to show the magnitude of the deformation. This colour map was devised for this application. It has the subtlety to show the asymmetry in the data that was not possible with a simple grey scale colour map.