**The NAFEMS Benchmark Challenge**

Stress at the Centre of a Square Plate with Linear Boundary Tractions

A unit square homogeneous and isotropic steel plate is centred at the origin of the XY-plane with edges parallel with the coordinate axes and is loaded with linearly distributed normal and tangential boundary tractions as shown in figure 1. The plate can be assumed to be thin so that a plane-stress constitutive relationship is appropriate and for convenience a unit thickness may be used.
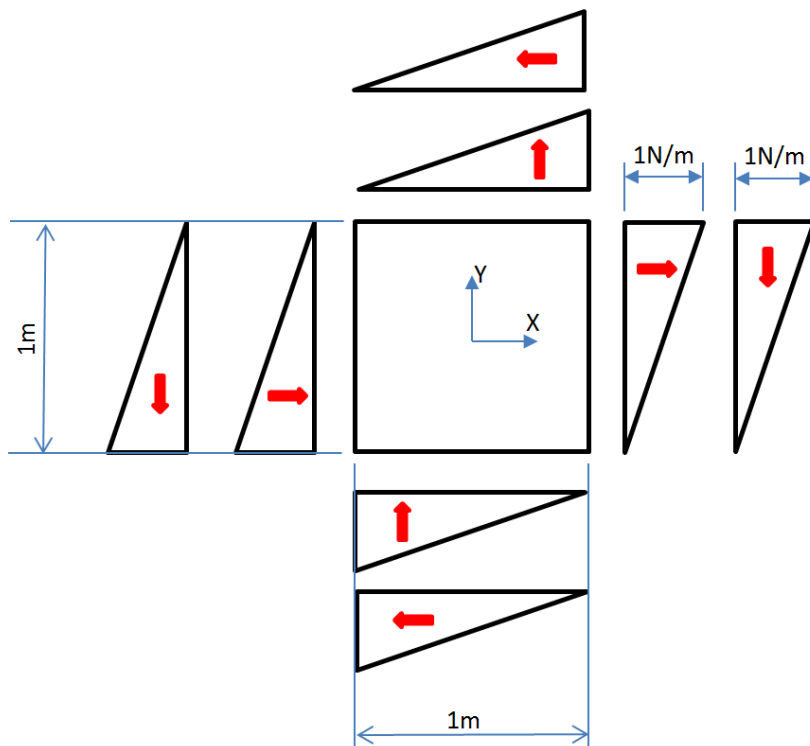
The Challenge

The challenge is to produce <u>two models</u> of this problem in your finite element software and then answer some questions. The first model should use a <u>single four-noded element</u> and the second a <u>single eight-noded element</u>. As engineers interested in the integrity of the plate we might wish to see the distribution of von Mises stress over the plate. We would like you to provide:

a) *Numerical values for the von Mises stress at the centre of the plate for both models,*
b) *A statement as to which of these values is correct,*
c) *Contour plots of von Mises Stress for both models,*
d) *A brief commentary on how you modelled the problem and what, if anything, of interest you note about this problem – please include details of the software that you used.*

Figure 1: Square Plate with Linear Boundary Tractions