The University of Iowa
College of Engineering
53:243/58:255 Computational Inelasticity
Fall Semester 2005
Instructor: C.C. Swan

Assignment #5: Due: 2 December, 2005

The objective of this assignment is extend the nonlinear Drucker-Prager elasto-plasticity model implemented in Assignment #4 to include a circular tension cap surface shown below in Figure 1. You do not need to concern yourself with the compression cap surface shown in Figure 1.

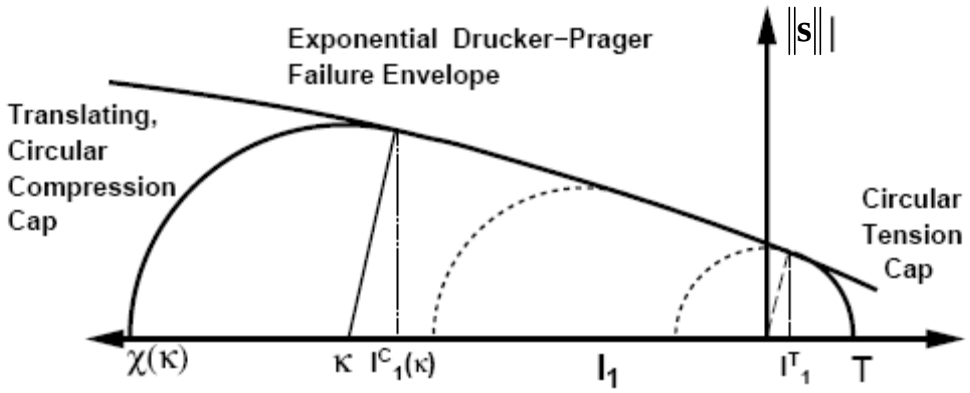

Figure 1.Smooth, three-surface, two-invariant yield function for cap model.

The radius of the tension cap surface is the distance from the origin of the $\|\mathbf{s}\| - I_1$ axes to the failure envelope. This distance will be a function of the material parameters chosen for the failure envelope. Since the radius of the tension cap does not need to be computed more than once for a given material system, you should do this only when the variable *ie = 11*. This variable will be passed in to your mod16d2 subroutine through a common block called *eldata*. At the top of your subroutine, after you declare your variables and dimension all of your arrays, include the following line in your fortran code.

```
common/eldata/ie,iprec,length,maxl,mtot,neg,nf,nl,npar(20),numeg
```

Once you compute the radius of the tension cap, store it in eoscon(9). In subsequent calls to mod16d2 (whenever $ie \neq 11$), you can recover this value from eoscon(9).

When you are finished implementing this addition to your material model, you will find two data sets in the directory /usr/ui/class/examples/cee5330/53_243/hw5 . Your program should be tested successfully on these data sets.