#1288: Radioss – Hyper elastic Arruda-Boyce material

Product: Radioss
Product Version: Radioss 2017.2 or above

Topic Objective

Use of Hyperelastic Arruda-Boyce material with Radioss.

Topic Details

This law describes the Arruda-Boyce material model, which can be used to model hyperelastic behavior. A stress vs strain curve can be defined as an input function in order to determine the material parameters by fitting this curve.

Material model is based on statistical mechanical approach (so called 8-chain model)

$$W = \mu \sum_{i=1}^{5} \frac{c_i}{(\lambda_m)^{2i-2}} \left(\bar{I}_1^{\,i} - 3^i \right) + \frac{1}{D} \left(\frac{J^2 - 1}{2} + \ln(J) \right) \qquad c_1 = \frac{1}{2}, c_2 = \frac{1}{20}, c_3 = \frac{11}{1050}, c_4 = \frac{19}{7000}, c_5 = \frac{519}{673750}$$

Only 3 parameters with clear physical meaning are necessary to define the material

Test data input:
= 1: Uniaxial
= 2: Equi-biaxial
= 3: Planar

```
#---1----|----2----|----3----|----4----|----5----|----6----|----7----|----8----|----9----|---10----|
/MAT/LAW92/2
Rubber
#              Rho_i
               1.5E-9
#                 Mu                   D                 LAM
                   0                   0                   0
#    Itype    Func_ID                  Nu
           1          3                .495
#---1----|----2----|----3----|----4----|----5----|----6----|----7----|----8----|----9----|---10----|
```