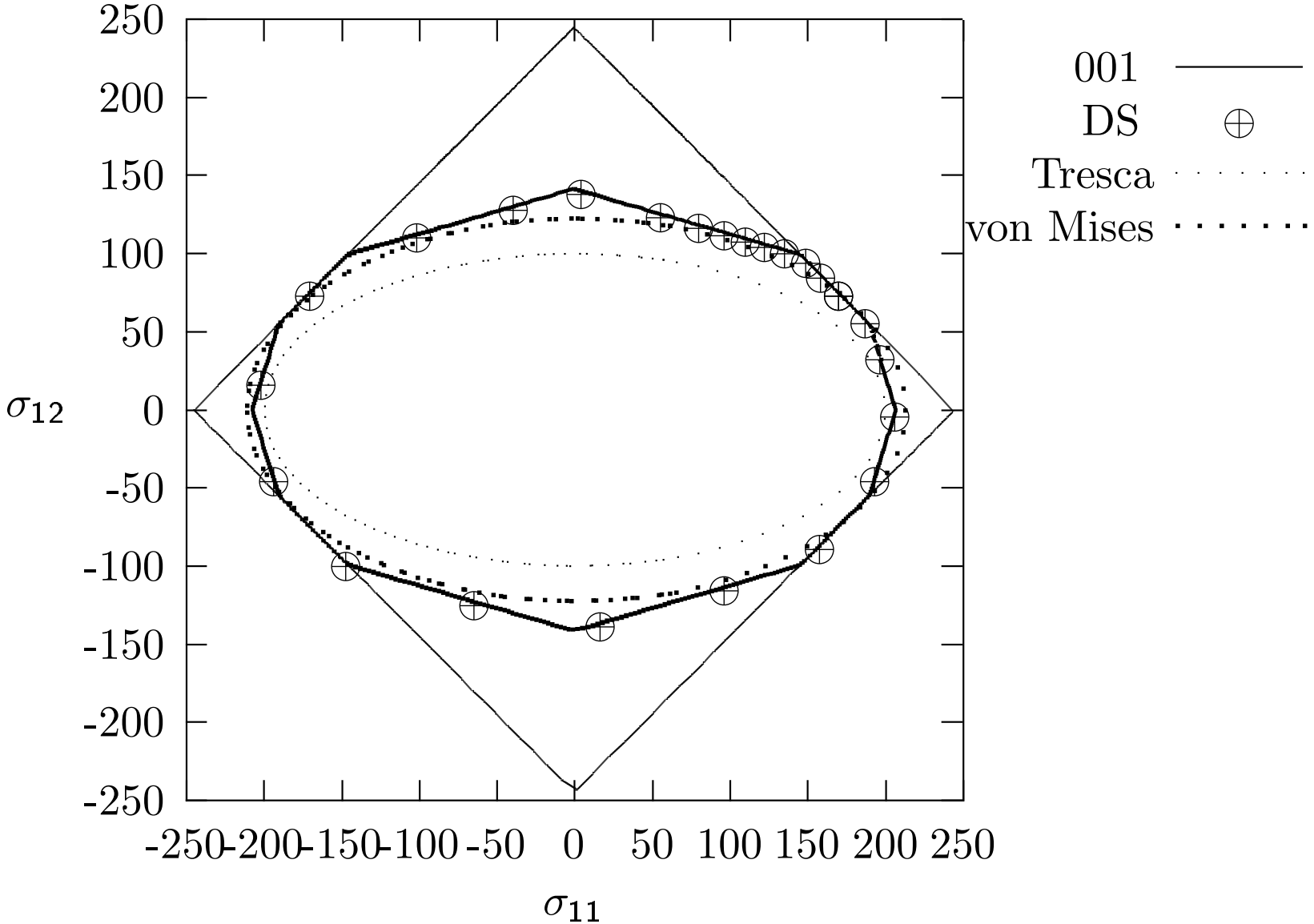
Yield surfaces for a Directionally Solidified material

- A Directionally Solidified material is simulated here by considering a reduced number of grains, that share their (001) axis, parallel to x_3 axis of the laboratory frame. The orientation of each grain is thus defined by one angle only, whose value can be taken between 0 and 90°, due to the cubic symmetry. The orientations are equally spaced, so that, for instance in the case of two grains, the (001) direction of each of them will make angles of 0 and 45°with x_1 axis, for the case of three grains, angles of 0, 30 and 60°, etc...
- Elasticity is assumed to be homogeneous in the aggregate (cubic elasticity is not taken into account), in order to have a uniform stress field in all the grains as long as the elastic yield is not reached.
- In the plane σ_{11}–σ_{12}, the large amount of available systems produces a rapid evolution of the shape of the elastic boundary when the number of grains increases. The surface shape approaches Tresca's. This is not the case for the plane σ_{33}–σ_{13}, as new grains do not introduce new slip opportunities in this direction.
- This document offers two simulation examples:
  - SEE σ_{11}–σ_{12} pour 3 grains — SEE σ_{33}–σ_{13} pour 3 grains
  - ...and provides a link to perform new computations: *GO*

Yield surface for DS material with 3 orientations



Yield surface for DS material with 3 orientations