VPSC history file

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Form of VPSC history file

```
80   3   0.01   298.
* boundary conditions
    0        1        1
    0        0        1
    0        0        1

    0.0005   0.       0.
    0.       0.0005   0.
    0.       0.      -0.001

    1        1        1
             1        1
                      0

    0.       0.       0.
             0.       0.
                      0.
```

$$\begin{bmatrix} L_{11} & L_{12} & L_{13} \\ L_{21} & L_{22} & L_{23} \\ L_{31} & L_{32} & L_{33} \end{bmatrix}$$

$$\begin{bmatrix} \sigma_{11} & \sigma_{12} & \sigma_{13} \\ & \sigma_{22} & \sigma_{23} \\ & & \sigma_{33} \end{bmatrix}$$

$$L_{ij} = \begin{bmatrix} \text{unknown} & 0 & 0 \\ \text{unknown} & \text{unknown} & 0 \\ \text{unknown} & \text{unknown} & -0.001 \end{bmatrix}$$

$$\varepsilon_{ij} = \begin{bmatrix} \text{unknown} & \text{unknown} & \text{unknown} \\ & \text{unknown} & \text{unknown} \\ & \text{unknown} & -0.001 \end{bmatrix}$$

$$\sigma = \begin{bmatrix} 0 & 0 & 0 \\ & 0 & 0 \\ & & \text{unknown} \end{bmatrix}$$

$$L_{ij} = \dot{F}_{ik} F_{kj}^{-1}$$

$$\dot{\varepsilon}_{ij} = \frac{1}{2}(L_{ij} + L_{ji})$$

$$\dot{\varepsilon}_{ij} = \frac{1}{2}(L_{ij} + L_{ji})$$

$$\dot{\omega}_{ij} = \frac{1}{2}(L_{ij} - L_{ji})$$

Rotation of crystal

Process number 4.

Transformation matrix that is used to rotated the polycrystal.

$\boldsymbol{g}^{sa\leftarrow ca}$: orientation of individual grain

You are to impose below operation:

$$\boldsymbol{g}^{sa\prime\rightarrow ca} = \boldsymbol{R}^{sa'\leftarrow sa}\boldsymbol{g}^{sa\leftarrow ca}$$

$$\boldsymbol{g}_{ij}^{sa'\rightarrow ca} = \boldsymbol{R}_{ik}^{sa'\leftarrow sa}\boldsymbol{g}_{kl}^{sa\leftarrow ca}$$

$\boldsymbol{R}_{ik}^{sa'\leftarrow sa}$; transform an old coordinate system sa to a new sa'

Final term

- A statistical representative population of discrete orientation sampled from an Interstitial-free steel will be given.
- It’s single crystal will be given.
- Following should be conducted based on these two:
  - Tensile along axis 1 for 0.5 axial strain. (Tension along RD)
  - Tensile along axis 2 for 0.5 axial strain. (Tension along TD)
  - Tensile along axis rotated from axis 1 in the plane of 1 / 2 for 0.5 axial strain (45 degree from RD)
  - Plot pole figures (the initial and after tensions)
  - Plot Stress-strain curves (RD, TD, 45)