Algorithm 1 NorSand model algorithm

1: Assembling the tangent matrix D_{ijkl}
2: $\delta\sigma_{ij} = D_{ijkl}\delta\epsilon_{kl}$
3: $\sigma_{trial} = \sigma + \delta\sigma$
4: $J_2 = \frac{1}{6}((\sigma_{11} - \sigma_{22})^2 + (\sigma_{11} - \sigma_{33})^2 + (\sigma_{33} - \sigma_{22})^2 + 6(\sigma_{12}^2 + \sigma_{23}^2 + \sigma_{33}^2))$
5: $p_{trial} = \sigma_i j\delta_{ij}/3,\ q_{trial} = \sqrt{3J_2}$
6: Then we going to calculating the yield surface
7: $M_i = M_{tc} \cdot (1 - \frac{\chi N|\psi|}{M_{tc}})$
8: $p_{max} = p_i \exp{(\frac{\chi\psi}{M_{tc}})}$
9: $F = q_{trial} - p_{trial}M_i(1 - \ln(\frac{p_{trial}}{p_i})),\ F_2 = p_{trial} - p_{max}$