Can Newtonian viscose model apply to plastic deformation?

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We verified whether a Newtonian viscose model simulates plastic deformation or not using microboudinaged structures.

The theoretically probability density function G(r,pusi) is derived (1).

Where m is the Weibull modulus, r is the aspect ratio of boudinaged grains, pusi is the stress parameter, sigma-zero is the far-field differential stress, Zi is the thickness of unit cell, Zc is the thickness of boudinaged grains, and S* is the modal fracture strength of boudinaged grains. As a result, the application was unsuccessful, because the correlation between measured and theoretical proportions of boudinaged grains was poor.

This fact indicates that the viscose model is not applicable to the stress-state of the microboudinage.

$$G(r,\phi) = 1 - \exp\left[-\frac{m-1}{m}\phi^{m} r^{2m+1}\right]$$

$$\phi = \frac{3}{2}\frac{Z_c}{Z_t}\frac{\sigma_0}{S^*}$$