Evaluation of the relaxation of plastic melt

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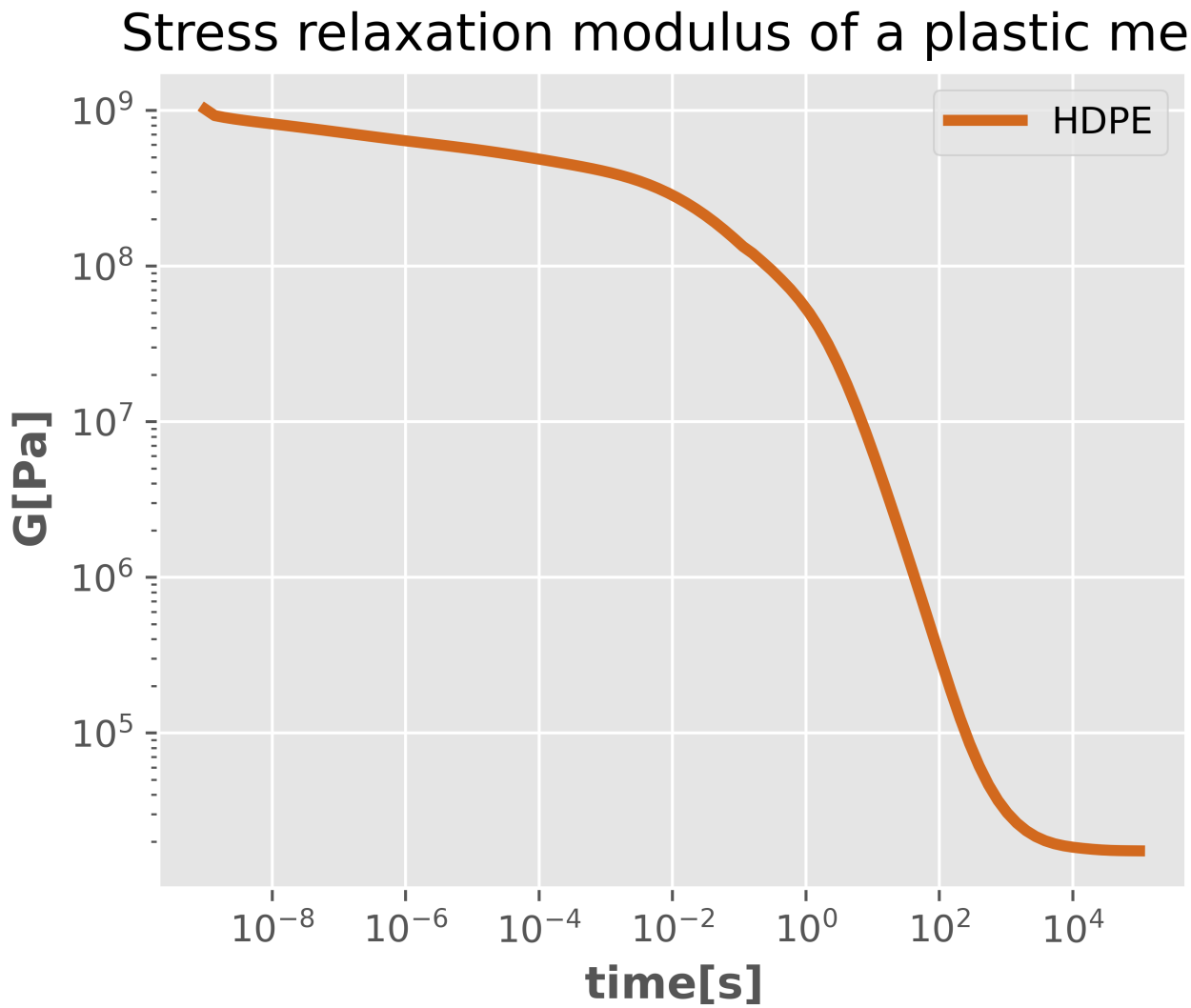
August 3, 2023

The relaxation of a plastic melt was evaluated by solving a modified version of the diffusion equation. The program is able to estimate the amount of stress relaxation in the plastic melt at any given time. The program incorporated the following:

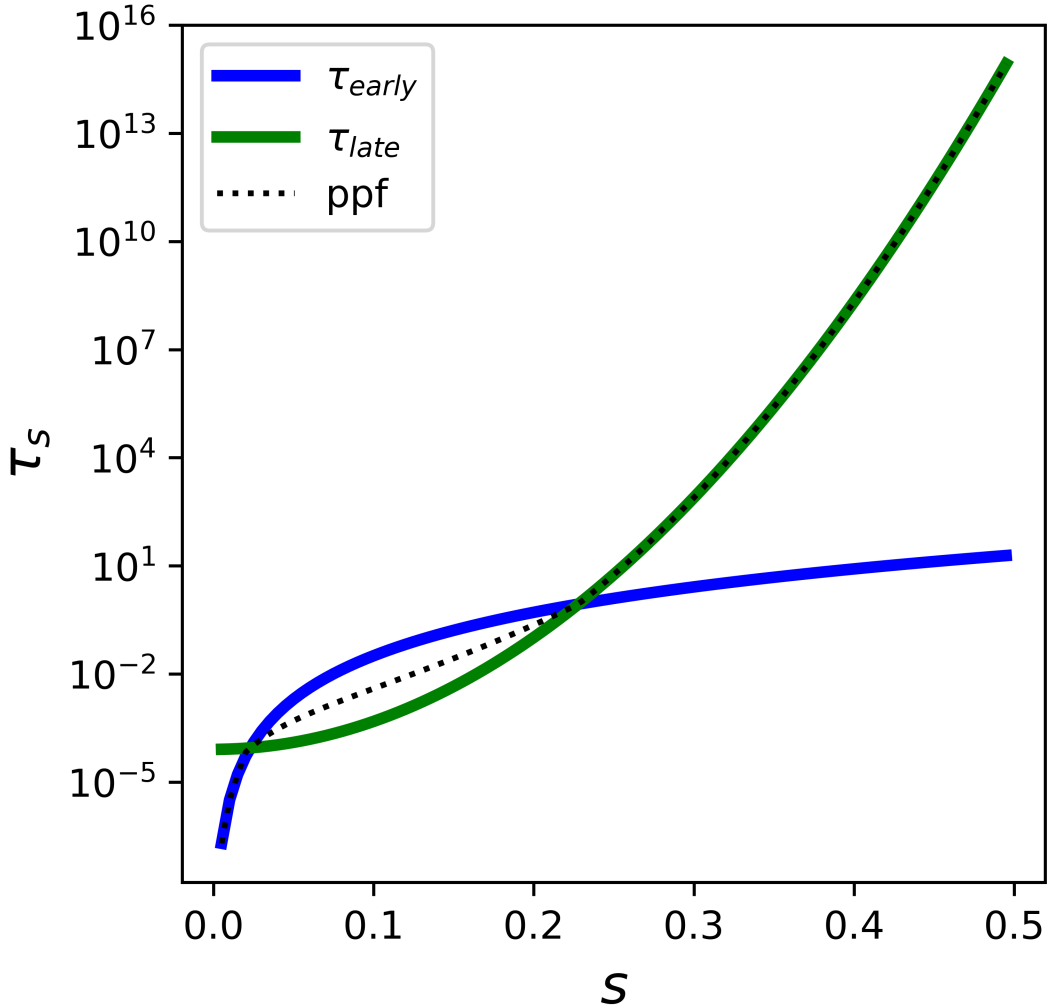
- the reptation of the chain along its axis
- the fluctuations along its contour length
- A check to ensure that relaxation is not faster than the rouse relaxation time
- a consideration of having both the chain and its surrounding in motion at the same time.

For the HDPE used in this simulation, the stress relaxation modulus is shown below.



contour lenght fluctuations

Observing the contour length fluctuation over half the chain's length for a chain of weight $297831 g/mol$ and comparing it to *Pattamaprom et al.(2000)* as a means of validation.



reference

Pattamaprom, C., Larson, R. G., & Van Dyke, T. J.
Quantitative predictions of linear viscoelastic rheological properties of entangled polymers.
Rheologica Acta 39 (2000): 517-531..

Shadrach Kwakye-Nimo, Yongwoo Inn, Youlu Yu, and Paula M. Wood-Adams
Polymer Fractionation at an Interface in Simple Shear with Slip
Macromolecules 55.15 (2022): 6609-6619..