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The influence of nonlinearity on the timescale of volume relaxation[1] PRASHANTH BADRINARAYANAN, SINDEE SIMON, Texas Tech University — The relationship between the timescales of volume and enthalpy relaxation has been studied extensively in the literature with differing results. Based on volume, enthalpy, and creep relaxation studies for polyetherimide, polystyrene, and selenium, a general picture was developed for the relationship between the relative timescales of different properties which was consistent with the data in the literature. According to the general picture, the timescales of different properties are similar at temperatures above the nominal value of T_g; however, the time scales diverge at temperatures below T_g with volume and creep exhibiting longer relaxation timescales compared to enthalpy. However, when the timescales are re-analyzed using the cooling rate dependence of T_g from capillary dilatometry and DSC, no divergence between the timescales of volume and enthalpy was observed, in contradiction with the general picture. It is hypothesized that the divergence in timescales observed in earlier work is due to the pronounced nonlinearity of volume relaxation compared to enthalpy relaxation. In this work, we use capillary dilatometry to test this hypothesis; in particular, we examine the effect of the magnitude of temperature down jumps on the volume relaxation timescale for polystyrene.

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