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Viscoelastic Behavior of Solid ^{4}He[1] CHI-DEUK YOO, ALAN T. DORSEY, Department of Physics, University of Florida — We model the torsional oscillator experiments by using the Kelvin-Voigt model of viscoelasticity for solid ^{4}He [1]. With this model we find that a relaxation time which grows rapidly as the temperature is lowered can produce both a peak in the inverse of Q-factor and a decrease in the resonant period of the torsional oscillator. We also identify two different regimes of the relaxation in temperature: the activation energy is found to be about 260 mK at high temperatures and 18.6 mK at low temperatures. By using the derived relaxation time we fit to the torsional oscillator result obtained by Clark *et al.* [2]. We find that the viscoelastic solid model provides a good agreement with the observed dissipation; however, it only accounts for a part of the measured resonant period shift, suggesting a possibility of the onset of superfluidity in solid ^{4}He.

[1] C.-D. Yoo and A. T. Dorsey, arXiv:0810.2525.
[2] A. C. Clark, J. T. West, and M. H. W. Chan, Phys. Rev. Lett. **99**, 135302 (2007).

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