Classical roughening of dislocations and the effect of shear modulus softening in solid ^{4}He.[1] EUGENE DZEDZITS, DARYA ALEINIKAVA, ANATOLY KUKLOV, CSI, CUNY, DAVID SCHMELTZER, CCNY, CUNY — We propose that shear modulus $\mu(T)$ softening with increasing temperature T observed by Day and Beamish [1] is due to a crossover experienced by dislocations from quantum smooth to classically rough state in the Peierls potential. Quantum dislocation is described by the Sine-Gordon model in dimensions $d = 1 + 1$ with long-range interactions between kinks (induced by exchanging bulk phonons). Monte Carlo simulations of this model show that finite T response on external stress can fit well the data $\mu(T)$ [1] for the parameters typical for ^{4}He. We compare this model with the one proposed in Ref. [1]: the ^{3}He impurities boiling off from the dislocations. Good fit of $\mu(T)$ cannot be achieved within this model for realistic values of the dislocation densities and relative fractions of ^{3}He atoms. [1] J. Day and J. Beamish, Nature **450**, 853(2007)

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