

Abstract Submitted
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Simultaneous measurements of the torsional oscillator and shear modulus of solid 4He diluted with various 3He concentration¹ JAEHO SHIN, WONSUK CHOI, JAEWON CHOI, SEONG JANG, Center for Supersolid & Quantum Matter Research and Department of Physics, KAIST, Daejeon 305-701, Republic of Korea, KEIYA SHIRAHAMA, Department of Physics, Keio University, Yokohama 223-8522, Japan, EUNSEONG KIM, Center for Supersolid & Quantum Matter Research and Department of Physics, KAIST, Daejeon 305-701, Republic of Korea — In 2004, Kim and Chan observed the non-classical rotational inertia (NCRI) of solid helium-4 by using a torsional oscillator (TO). Below 200mK, the resonance period of solid helium dropped, which was originally interpreted as the mass decoupling of the fraction of solid helium. Recently, anomalous increase in the shear modulus of solid helium was found and showed striking similarity in temperature, frequency, 3He concentration, and drive dependence to those of the NCRI [2]. To understand the connection between the NCRI and the shear modulus anomaly, we simultaneously measure the change in the resonance frequency and the stiffness of solid helium below 200mK. The torsion cell contains a pair of the concentric piezoelectric transducers (PZT) which defines an annular channel for the simultaneous measurements. We will report the interference between the motion of the TO at resonance and AC motion of the PZT in solid 4He with different 3He concentration.

[1] E.Kim and M.H.W Chan Nature 427, 225-227 (2004)

[2] J. Day and J. Beamish Nature 450, 853-856 (2007)

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