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Studies of Non-Classical Rotational Inertia of Solid ^{4}He[1] MICHAEL C. KEIDERLING, YUKI AOKI[2], HARRY KOJIMA, Rutgers Univ. — We have constructed a compound torsional oscillator which could be operated at two resonant modes (the first at 496 and the second at 1172 Hz). This device allowed us to study the non-classical rotation inertia of the identical solid ^{4}He at the two oscillator modes driven separately. We present here recent studies of NCRI when the two modes are simultaneously excited. The idea was to drive the first mode at variable high amplitude and to detect its effect on NCRI fraction by the second mode. We expected that when the solid ^{4}He was driven at high amplitudes with the first mode to produce significant reduction in NCRI fraction, the same reduction would be measured with the second mode driven simultaneously at very low amplitude. On the contrary, the observed reduction in NCRI fraction by the second mode was much *smaller* than that expected from the first mode. If the driver/detector roles of the first and second modes were reversed, the amount of reduction of NCRI fraction detected and induced by a high drive amplitude of the second mode became *greater* in the first mode driven at a low amplitude. The critical drive amplitude effects of NCRI induced in one mode are not entirely "seen" by the other mode in our oscillator.

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