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A Neutron Scattering Kernel of Solid Methane in phase II YUNCHANG SHIN, WILLIAM MICHAEL SNOW, CNEN-YU LIU, CHRISTOPHER M. LAVELLE, DAVID V. BAXTER — A neutron scattering cross section model of solid methane was studied for the cold neutron moderator of Low Energy Neutron Source (LENS) at IUCF/Indiana University especially in temperature range of 20.4–4K. The analytical scattering kernel was adapted from Ozaki et al. [1][2] to describe molecular rotation in this temperature range. This model includes a molecular translation and intra-molecular vibration as well as the rotational degree of freedom in effective ways. For more broad applications into monte carlo simulations, neutron scattering libraries for MCNP were produced from the frequency spectrums using NJOY code. We have tested this newly-developed scattering kernels for phase II solid methane by calculating the neutron spectral intensity expected from the methane moderator at the LENS neutron source using MCNP. The predictions are compared to the measured energy spectra. The simulations agree with the measurement data at both temperatures. The simulation results show good agreement with measurement data in different temperatures.

[1] Y. Ozaki, Y. Kataoka, and T. Yamamoto, *The Journal of Chemical Physics* 73, 3442 (1980).

[2] Y. Ozaki, Y. Kataoka, K. Otaka, and T. Yamamoto, *Can. J. Physics*. 59, 275 (1981).

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