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Static and Dynamic Magnetic Properties of $S = 1/2$ Inequilateral Diamond-Chain Compounds $A_3Cu_3AlO_2(SO_4)_4$ (A =K, Rb, Cs) KATSUHIRO MORITA, TAKANORI SUGIMOTO, TAKAMI TOHYAMA, Department of Applied Physics, Tokyo University of Science, SHIGETOSHI SOTA, RIKEN Advanced Institute for Computational Science, HIROKO KOORIKAWA, MASAYOSHI FUJIHALA, SETSUO MITSUDA, Department of Physics, Tokyo University of Science — In highly frustrated one-dimensional quantum spin systems, there emerge various exotic ground states, such as gapless spin-liquid and gapped singlet dimer phases. In a magnetic field, the systems exhibit magnetization plateaus because of frustration and quantum uctuations. In the previous study, we have made magnetic measurements of diamond spin chain compounds $A_3Cu_3AlO_2(SO_4)_4$ (A = K, Rb, Cs) [1]. $K_3Cu_3Al_2(SO_4)_4$ does not show magnetic order down to 1.8K, indicating a possible spin-liquid ground state. However, the exchange interactions are not specified, so that it has been unclear what kind of mechanism is responsible for the spin liquid state. We determine the exchange interactions by fitting the temperature dependence of the susceptibility for $A_3Cu_3AlO_2(SO_4)_4$ to the result of the exact diagonalization calculations for an 18-spin diamond periodic chain. Based on the estimated exchange interactions in $K_3Cu_3AlO_2(SO_4)_4$, we predict the magnetization curve with the 1/3 plateau and inelastic neutron scattering spectrum by density-matrix renormalization group (DMRG) calculations. [1] M. Fujihala *et.al.*, J. Phys. Soc. Jpn. **84** 073702 (2015).

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