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Thermodynamics and magnetization process of the frustrated ferromagnetic spin-1/2 chain FABIAN HEIDRICH-MEISNER, Department of Physics and Astronomy, The University of Tennessee and Condensed Matter Sciences Division, Oak Ridge National Laboratory, DANIEL C. CABRA, TEMO VEKUA, Laboratoire de Physique Théorique, Université Louis Pasteur Strasbourg, France, ANDREAS HONECKER, Institut für Theoretische Physik, Technische Universität Carolo-Wilhelmina zu Braunschweig, Germany — We report a study of the thermodynamics and magnetization curve of a J_1–J_2 spin-1/2 chain with a ferromagnetic nearest neighbor coupling J_1 and an antiferromagnetic next-nearest neighbor interaction J_2. This model has recently been suggested to describe the properties of different compounds such as $LiCuVO_4$ and $Rb_2Cu_2Mo_3O_{12}$. We present results for both the specific heat and the magnetic susceptibility for the whole parameter range of $J_2/4 < |J_1| < 0$ obtained by exact diagonalization of up to $N = 24$ sites. The specific heat exhibits a two-peak structure for $J_1 < 0$, originating from, first, the proximity to a ferromagnetic ground state and, second, antiferromagnetic fluctuations at higher energies. Furthermore, the magnetization process at zero temperature is analyzed by means of the density matrix renormalization group technique. Particular emphasis is given to the presence (or rather absence) of magnetization plateaus and a comparison with other theoretical results for the ground-state phase diagram.

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