2006 Vol.46 No.4 pp.591-594 DOI:

Energy as Entanglement Witness in Bilinear-Biquadratic Spin-1 Chain

XU Feng, WANG An-Min, ZHAO Ning-Bo, SU Xiao-Qiang, and ZHU Ren-Gui

Department of Modern Physics, University of Science and Technology of China, Hefei 230026, China
(Received: 2005-12-1; Revised: 2006-3-9)

Abstract: Energy is introduced as an entanglement witness to describe the entanglement property of a quantum system. The thermal equilibrium system is guaranteed to be entangled when system is cooled down below the entanglement temperature T_E. By virtue of this concept we exploit the minimum separable state energy and entanglement temperature T_E of the bilinear-biquadratic antiferromagnetic spin-1 chain model. We numerically calculate T_E for arbitrary values of the strength of biquadratic exchange interaction Q up to N=7. We find T_E decreases with Q for fixed N when Q is between -3 and 1/3 (J=1). In this regime T_E also decreases with N for fixed Q and varies slowly for large N. While the thermal system is always entangled when Q is smaller than -3.

PACS: 03.65.Ud, 75.10.Pq

Key words: entanglement witness

[Full text: PDF]

Close