

The polynomial approach to the standard pairing model

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The Heine-Stieltjes correspondence is extended and applied to solve Bethe ansatz equations of the standard pairing model[1, 2], from which the extended Heine-Stieltjes polynomial approach to the model is proposed. Exact solutions of the model for nuclei are formulated from the corresponding polynomials [3]. The effect of pairing correlation on the spectral statistical behaviors of the model is studied based on the exact solutions. It is found that variation of the pairing interaction strength G in the model is likely to change the statistical properties of the spectrum. The spectrum is regular when G is small but nonzero or G is large enough. The more or less chaotic behavior occurs near the critical point of the localized normal phase to the superconducting (pair condensate) phase in the model. As an application to realistic nuclear system, $J = 0$ level statistics of ^{154}Sm is analyzed within the spherical shell model mean-field plus standard pairing model.

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