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Applicability of the Friedberg-Lee-Zhao Method

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Abstract: Friedberg, Lee and Zhao (FLZ) proposed a method for effectively evaluating the eigenenergies and eigen wavefunctions of quantum systems. In this work, we study several special cases to investigate applicability of the method. Concretely, we calculate the ground-state eigenenergy of the Hellmann potential as well as the Cornell potential, and also evaluate the energies of the systems where linear term is added to the Coulomb as a perturbation. The results obtained in this method have a surprising agreement with the traditional method or the numerical results. Since the results in this method have obvious analyticity compared to that in other methods, and because of the simplicity for calculations this method can be applied to solving the Schrödinger equation and provides us a better understanding of the physical essence of the concerned systems. But meanwhile applications of the FLZ method are restricted at present, especially for certain potential forms, but due to its obvious advantages, it should be further developed.

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