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Semi-classical Determination of the Energy Levels of a $x^{4/3}$ Potential KALE OYEDEJI, Morehouse College, RONALD MICKENS, Clark Atlanta University — Given a classical solution to a 1-dim in space system, for which all the solutions are periodic, the application of the modified Bohr-Sommerfeld quantization condition [1] allows a determination of semi- classical estimates for the energy levels of the associated quantum system. We consider a $x^{4/3}$ potential and use the methods of harmonic balance and iteration to calculate accurate approximations to the classical periodic solutions [2]. With these results, a general semi-classical energy spectrum can be determined. To judge the accuracy/validity of these calculations, we use a simple functional form for the ground state wave function in a variational calculation of the associated energy and compare this value with our semi-classical result.

[1] A. B. Migdal and V. P. Krainov, "Approximation Methods in Quantum Mechanics (W. A. Benjamin, New York, 1969).
[2] R. E. Mickens, Journal of Sound and Vibration 292 (2006), 964-968.

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