

## Comments on “Hamiltonian systems with indefinite kinetic energy”<sup>1</sup>

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In the paper<sup>1</sup> (*Pramana – J. Phys.* **27** 497 by N N Rao *et al*), the authors first seek to “transform” a system with non-positive definite kinetic energy to one with a positive definite kinetic energy. This is a pointless exercise in view of the well known fact (see Nayfeh and Mook, 1979, p. 382)<sup>2</sup> that the motion of the effective particle represented by a Hamiltonian with non-positive definite kinetic energy has an unbounded character; it is like trying to find a variational principle for a dissipative system! In fact, the authors find that this attempt is fruitless except for the trivial case when the potential function is separable!

The authors then discuss that it is, however, possible to obtain non-separable, indefinite Hamiltonians that are integrable by means of “complexification” of real, one-dimensional dynamical systems. And they present two problems—one on coupled Langmuir-ion acoustic waves and the other on nonlinear circularly-polarized electromagnetic waves, as “physical examples where (complexification) bears some relevance”. But, the potential functions for these both examples are not harmonic functions so that the discussion of “complexification” has no relevance to these examples! Besides, since the authors have not presented a physical system which corresponds to these complex solutions, the physical implications of the latter remain unclear.

### References

<sup>1</sup>Rao N N, Buti B and Khadkikar S B 1986 *Pramana – J. Phys.* **27** 497

<sup>2</sup>Nayfeh A H and Mook D T 1979 *Nonlinear oscillations* (Wiley-Interscience)