SOME PROPERTIES OF SYSTEMS WITH QUADRATIC HAMILTONIANS

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For quantum mechanical systems with quadratic Hamiltonian the following holds: the time evolution of its classical counterpart (or equivalently its classical limit), the time evolution of mean values of position and momentum for arbitrary value of Planck constant (if the initial conditions are conveniently chosen on the orbit of generalized coherent states), the time evolution of its classical projection for arbitrary value of Planck constant (again with conveniently chosen initial conditions), the time evolution in nonlinear quantum mechanics and in some cases also the "linear" quantum mechanical time evolution are all in a very close correspondence. In a sense, they can be regarded as being identical. In particular, these results hold for harmonic oscillator and free particle.