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Generalized Gaussian Wave Packet Dynamics for Chaotic Systems

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By developing the connection between the semiclassical method of heteroclinic orbit summations[1] and generalized Gaussian wave packet dynamics (GGWPD),[2] we demonstrate how to implement GGWPD for fully chaotic systems where the information about the nonlinearities in the dynamics resides in a sum over multiple saddle points. These complex saddle point trajectories are found using a scheme equivalent to a Newton-Raphson method of root finding using the heteroclinic orbits because each one resides within the domain of convergence of a unique saddle point; there are exceptions which are easy to identify. In this sense, the saddle points thus found correspond to classically allowed transport. The method is applied to the chaotic kicked rotor and comparisons of the accuracy are made between the quantum results and the saddle point and heteroclinic orbit approximations.

In collaboration with Harinder Pal and Manan Vyas, Universidad Nacional Autonoma de Mexico.

[1]S. Tomsovic and E. J. Heller, Phys. Rev. E 47, 282 (1993)
[2]D. Huber, E. J. Heller, and R. G. Littlejohn, J. Chem. Phys. 89, 2003 (1988)