Abstract Submitted
for the DPP16 Meeting of
The American Physical Society

Chirped nonlinear resonance dynamics in phase space[1] LAZAR FRIEDLAND, TSAFRIR ARMON, Hebrew University of Jerusalem — Passage through and capture into resonance in systems with slowly varying parameters is one of the outstanding problems of nonlinear dynamics. Examples include resonant capture in planetary dynamics , resonant excitation of nonlinear waves, adiabatic resonant transitions in atomic and molecular systems and more. In the most common setting the problem involves a nonlinear oscillator driven by an oscillating perturbation with a slowly varying frequency, which passes through the resonance with the unperturbed oscillator. The process of resonant capture in this case involves crossing of separatrix and, therefore, the adiabatic theorem cannot be used in studying this problem no matter how slow is the variation of the driving frequency. It will be shown that if instead of analyzing complicated single orbit dynamics in passage through resonance, one considers the evolution of a distribution of initial conditions in phase space, simple adiabaticity and phase space incompressibility arguments yield a solution to the resonant capture probability problem. The approach will be illustrated in the case of a beam of charged particles driven by a chirped frequency wave passing through the Cherenkov resonance with the velocity distribution of the particles.

[1]Supported by Israel Science Foundation Grant 30/14

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Date submitted: 15 Jul 2016 Electronic form version 1.4