**Meeting:** 998, Houston, Texas, SS 16A, Special Session on Mathematical Physics

998-35-266 **Nikola P Petrov*** (npetrov@umich.edu), Department of Mathematics, University of Michigan, 525 East University Ave, Ann Arbor, MI 48109-1109, **Rafael de la Llave** (llave@math.utexas.edu), Department of Mathematics, University of Texas, 1 University Station C1200, Austin, TX 78712-0257, and **John A Vano** (jvano@math.wisc.edu), Department of Mathematics, University of Wisconsin, Madison, WI 53706-1388. *Dynamical systems approach to resonant effects in pulsating one-dimensional resonators.*

We study the problem of the asymptotic behavior of the electromagnetic field in an one-dimensional optical resonator one of whose walls is at rest and the other is moving periodically or quasiperiodically (with $d \geq 2$ incommensurate frequencies).

We show that this problem can be reduced to a problem about the behavior of the iterates of a map of the circle in the periodic case, or a map of the $d$-dimensional torus that preserves a foliation by irrational straight lines in the quasiperiodic case.

We demonstrate how the dynamical properties of these maps can be interpreted as properties of the field in the cavity. In particular, we show that when the torus map satisfies a KAM theorem – which happens for a Cantor set of positive measure of parameters – the energy of the electromagnetic field remains bounded. When the torus map is in a resonant region – which happens in open sets of parameters inside the gaps of the previous Cantor set – the energy grows exponentially. The average Doppler factor (the rate of the exponential growth of the energy in the system) is simply related with the Lyapunov exponent of the corresponding map. (Received March 01, 2004)