

1040-93-172

Navin Khaneja* (navin@eecs.harvard.edu), 33 Oxford Street, MD 335, Cambridge, MA 02138.

Control of Inhomogeneous Ensembles.

Many applications in control of quantum systems involve controlling a large ensemble by using the same control input. In practice, the elements of the ensemble could show variation in the parameters that govern the dynamics of the system. For example, in magnetic resonance experiments, the spins of an ensemble may have large dispersion in their natural frequencies, strength of applied rf-field (rf-inhomogeneity) and the relaxation rates of the spins. A canonical problem in control of quantum ensembles is to develop external excitations that can simultaneously steer the ensemble of systems with variation in their internal parameters from an initial state to a desired final state. In this talk we present controllability results and optimal control problems related to control of ensembles. We present examples that highlight the remarkable property of a class of nonlinear systems that they can be steered arbitrary close to a desired point in spite of the fact that the natural dynamics and control inputs to the system may not be completely certain. (Received February 11, 2008)