

NUMERICAL ANALYSIS AND SCIENTIFIC COMPUTING
SEMINAR

*Control of oscillators, temporal homogenization, and energy
harvest by super-parametric resonance*

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Abstract: We show how to control an oscillator by periodically perturbing its stiffness, such that its amplitude follows an arbitrary positive smooth function. This also motivates the design of circuits that harvest energies contained in infinitesimal oscillations of ambient electromagnetic fields. To overcome a key obstacle, which is to compensate the dissipative effects due to finite resistances, we propose a theory that quantifies how small/fast periodic perturbations affect multidimensional systems. This results in the discovery of a mechanism that we call super-parametric resonance, which reduces the resistance threshold needed for energy extraction based on coupling a large number of RLC circuits.

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MATHEMATICS AND COMPUTER SCIENCE
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