

TEMPLE UNIVERSITY
Department of Mathematics

Applied Mathematics and Scientific Computing Seminar

Room 617 Wachman Hall
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Computer Aided Design of Micro-Electro-Mechanical Systems: From Energy Losses to Dick Tracy Watches

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Abstract. Resonant Micro-Electro-Mechanical Systems (MEMS) can be used as sensors, frequency references, and filters. Surface-micromachined resonators currently under development can be integrated with circuitry, so that soon a "cell phone on a chip" may be possible. For these resonators to be useful for such radio applications, engineers need to understand and minimize the amount of damping in the system. In this talk, we discuss numerical modeling of damping in resonant MEMS using HiQLab, our simulation package. In particular, we discuss model reduction methods that allow us to quickly and accurately simulate the damped frequency response of different types of resonant MEMS, and show how we can use our knowledge of structure in the full model to improve the efficiency and accuracy of the model reduction procedures. We illustrate our methods with simulations of damping in several types of resonant microstructures.