Mathematics of Musical Sound Synthesis

The synthesis of musical sound involves a wide range of methods ranging from the simulation of the physics of musical instruments to the use of abstract mathematics for generating new sounds. In this talk, I will discuss a number of these methods, including the efficient simulation of strings and wind instruments based on the traveling wave solution originally discovered by d’Alembert. By studying the topological properties of traveling waves, I will also show that clarinets are actually musical Möbius loops. I will also explore the sound of rubbing wine glasses and of two-dimensional structures such as drums and cymbals. In this context we will meet singularity theory and deterministic chaos. I will close by discussing abstract dynamical systems as sources for generating more or less unpleasant sounds and strategies to make them more controllable for musical performers.

Light refreshments will be served at 1:30pm in E424A.

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