**Optimal placement of sensors and actuators for waves**

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 In this lecture we address the problem of the optimal placement of sensors and actuators for wave equations. We focus mainly on the 1-d case. Using Fourier series representations the problem can be recast as an optimal design one involving all the spectrum of the laplacian. We shall develop a complete theory allowing to distinguish, depending on the complexity of the data to be observed/controlled, cases in which the solution is a classical set constituted by a finite number of subitervals, from others in which the optimal set is of Cantor type or those when relaxation occurs. These results will be illlustrated by numerical simulations. The lecture is base don recent joint work in collaboration with Y. Privat and E. Trélat.