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On the Fourier method for solving a control problem for string oscillation.

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Exact boundary controllability of the wave equation is, by now, a fairly well understood topic in control theory. The problem consists of finding a control – for instance in the form of Dirichlet boundary data – which steers the system to rest (0 displacement and 0 velocity) in finite time. This theory has received great impulse during the last few decades which have clarified the relations between observability and controllability. New methods were developed, like the Hilbert Uniqueness Method (HUM), that solve the controllability problem provided that one is able to prove suitable observability estimates. The paper under review is motivated by the application of such a method to a one-dimensional problem

$$y_{tt} - y_{xx} = 0,\ x \in [0, L],\ t \geq 0, \quad y(0, t) = u(t),\ y(L, T) = 0.$$

Indeed, the HUM procedure also gives a way to construct the required control, in terms of certain operators in Hilbert spaces which are usually hard to compute explicitly. If the problem is set in one space dimension, however, then one can use Fourier series expansions to solve the state equation and, as the authors of this paper show, to derive an approximation scheme for the HUM construction. *P.Cannarsa (Roma)*

Keywords: exact boundary controllability; Hilbert uniqueness method; wave equation; approximation scheme