

WAVE AND HEAT PROCESSES: SOME CONNECTIONS

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This lecture is based on recent joint work with S. Ervedoza [1].

We present the derivation of new estimates for the cost of observability of heat equations. We develop a new method allowing to show that, when the corresponding wave equation is observable, the heat equation is also observable. This method allows to describe the explicit dependence of the observability constant on the geometry of the problem (the domain in which the heat process evolves and the observation subdomain). We show that our estimate is sharp in some cases, and in particular in one space dimension and in the multi-dimensional radially symmetric case.

Our approach is based on an explicit representation formula of some solutions of the wave equation in terms of those of the heat equation, contrarily to the standard application of transmutation methods, which uses a reverse representation of the heat solution in terms of the wave one.

We will also comment the applications of our techniques to controllability properties of heat-type equations.

References

- [1] S. ERVEDOZA AND E. ZUAZUA, Sharp observability estimates for heat equations, *Archives Rat. Mech. Anal.*, to appear.

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