

Zuazua, Enrique

Controllability and observability of partial differential equations: some results and open problems. (English) [Zbl 1193.35234](#)

Dafermos, C.M.(ed.) et al., Handbook of differential equations: Evolutionary equations. Vol. III. Amsterdam: Elsevier/North-Holland (ISBN 978-0-444-52848-3/hbk). Handbook of Differential Equations, 527-621 (2007).

The author of this chapter is the well-known expert in control problems for systems described by PDEs. The chapter consists of 8 sections. Section 1 and 2 give a brief introduction to linear finite-dimensional systems. Sections 3 and 4 are devoted to describe the main issues related to controllability of the linear wave and heat equations, respectively and the basic known results in this field.

Also the problem of the existence of bang-bang controls is discussed. Section 5 is devoted to the known observability results for heat equations with potentials. In Section 6 new results on the observability of the heat equation with low regularity variable coefficients on the principal part are presented. Section 7 is devoted to some models coupling heat and wave equations. The last section, Section 8, presents some open problems and future directions of research. The chapter having a survey character, presents the state-of-the-art in the field of controllability and observability for PDEs. The author presents the main tools such as the so-called Hilbert Uniqueness Method (HUM), multipliers method, microlocal analysis and Carleman inequalities. The ample bibliography contains 181 items.

For the entire collection see [[Zbl 1179.35003](#)].

Reviewer: [Wiesław Kotarski \(Sosnowiec\)](#)

MSC:

- [35Q93](#) PDEs in connection with control and optimization
- [93B05](#) Controllability
- [93B07](#) Observability
- [35A27](#) Microlocal methods and methods of sheaf theory and homological algebra applied to PDEs

Cited in **105** Documents

Keywords:

[controllability](#); [observability](#); [PDEs](#)