Why we need Control Theory ?

Amine Sbai [*a,b]

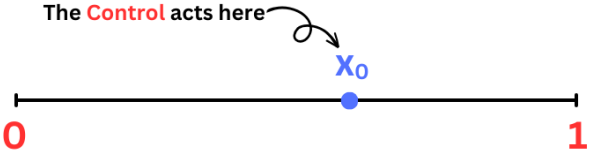
[a]Hassan First University of Settat, Morocco
[b]University of Granada, Spain

Abstract

The main objective of this talk is to discuss some motivations for the control theory of partial differential equations. As an application, we will treat the case of the following one-dimensional degenerate/singular heat equation

$$\begin{cases} y_t - (x^\alpha y_x)_x - \dfrac{\mu}{x^{2-\alpha}} y = \delta_{x_0} v(t), & (t,x) \in Q = (0,T)\times(0,1), \\ y(t,0) = y(t,1) = 0, & t \in (0,T), \\ y(0,x) = y_0(x), & x \in (0,1), \end{cases} \tag{P}$$

- $v(t)$: Control function,
- $x_0 \in (0,1)$: control region,
- δ_{x_0}: the Dirac delta function,
- $0 \le \alpha < 1$, $\mu \le \mu(\alpha) = \frac{(1-\alpha)^2}{4}$,
- $T > 0$: Target time fixed,
- $y_0 \in L^2(0,1)$.



keywords: Controllability, degenerate equations, singular potential, moment method.

References

[1] B. Allal, A. Hajjaj, J. Salhi, A. Sbai, *Boundary controllability for a coupled system of degenerate/singular parabolic equations*, Evolution Equations and Control Theory, vol. 11, no. 5, 2022, p. 1579, doi: 10.3934/eect.2021055.

[2] B. Allal, J. Salhi, A. Sbai *Boundary controllability for a coupled system of parabolic equations with singular potentials*, Nonlinear Differ. Equ. Appl. 29, 61, doi: 10.1007/s00030-022-00792-1.

[3] A. Sbai, *Pointwise Controllability for degenerate/singular equations via the moment method*, 2023, preprint.

*asbai@correo.ugr.es