Controllability of Partial Differential Systems

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Abstract

Controllability of linear differential systems is well-known. In particular we have at our disposal the famous Kalman rank condition, that is to say, if A, B are matrices, $A \in \mathcal{L}(\mathbb{R}^n)$, $B \in \mathcal{L}(\mathbb{R}^m, \mathbb{R}^n)$, then the system $Y' = AY + Bu$ is controllable at time $T > 0$ if and only if

$$\text{rank } [A \,|\, B] = \text{rank } \left[B, AB, ..., A^{n-1}B \right] = n.$$

What is the situation for Partial Differential Systems ? Can we expect a generalization of Kalman's condition? This is not yet a solved problem. Recently, some partial answers has been obtained. The main goal of this talk is to investigate this question by giving the most important results.