Remarks on the controllability of some particular parabolic systems

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We propose in this talk some results on the controllability of two types of parabolic systems.

The first type concerns parabolic systems with delay. The question is to study the effect of this delay on the approximate and null-controllability by localized controls acting on subdomains.

The second type is related to parabolic systems of the form

$$\begin{cases} (\partial_t - A)\, y = B\chi_\omega u, & (0,T)\times\Omega \\ y = 0 & (0,T)\times\partial\Omega \\ y(0) = y^0 \in L^2(\Omega)\times L^2(\Omega) \end{cases}.$$

Here, the energy space is $H = L^2(\Omega)\times L^2(\Omega)$, $u \in L^2((0,T)\times\Omega)$, $B \in \mathbb{R}^2$, and A is a 2×2 matrix differential operator, elliptic in the Douglis-Nirenberg sense and formally selfadjoint. The particularity of the class of operators A we are intersted by is that its spectrum contains essential spectrum. Our aim is to study the effect of these essential spectrum on the null-controllability of the system.