



MAFIA - the seminar you can't refuse

Essential spectrum of mixed-order systems due to singularity

Orif Ibrogimov ¹

ČVUT v Praze

11 December 2018

13:15–14:15

in T112

Fakulta jaderná a fyzikálně inženýrská, ČVUT v Praze
Trojanova 13, 12000 Praha

Abstract: We analyze the essential spectrum of block operator matrices with possibly non-symmetric differential operator entries arising in physical applications. The essential spectrum contains all the points violating the ellipticity of the formal determinant whenever the operator matrix contains a zero-order diagonal entry. Moreover, it is well-known that singularity at infinity or boundary of underlying domain may cause an additional branch of the essential spectrum. While the latter phenomenon is more or less well understood for a fairly large class of mixed-order systems of ordinary differential operators in the self-adjoint setting, a rigorous analysis in the non-self-adjoint setting has been lacking so far.

In this talk we focus on the analysis of the essential spectrum of operator matrices generated by singular matrix differential expressions of the form

$$\mathcal{A} := \begin{pmatrix} -\frac{d^2}{dx^2} + q(x) & \frac{d}{dx} \frac{\beta(x)}{x} \\ -\frac{\gamma(x)}{x} \frac{d}{dx} & \frac{m(x)}{x^2} \end{pmatrix}$$

in the Hilbert space $L^2(0,1) \oplus L^2(0,1)$ with sufficiently regular functions $q, \beta, \gamma, m : [0,1] \rightarrow \mathbb{C}$. In particular, we describe mechanisms of appearance of essential spectra due to singularity.

The talk is based on a joint work with Petr Siegl (Queen's University, Belfast, UK).

¹ibrogorif@fjfi.cvut.cz, <http://people.fjfi.cvut.cz/ibrogori/>