



Contribution ID: 44

Type: **Contributed Talk**

## Analysis of DAEs and PDEs in the form of abstract differential-algebraic equations with a higher-index regular pencil

*Friday, 27 February 2026 09:50 (20 minutes)*

This talk presents an approach to the qualitative analysis of differential-algebraic equations (DAEs) and partial differential equations (PDEs) presented in the form of abstract differential-algebraic equations (ADAEs) with the regular characteristic pencils of arbitrarily high indices. We will deal with the ADAE of the form  $\frac{d}{dt}[Ax] + Bx = f(t, x)$ , where  $A$  and  $B$  are closed linear operators from a Banach space  $X$  into a Banach space  $Y$  with domains  $D_A$  and  $D_B$  ( $\overline{D_A} = \overline{D_B} = X$ ) and  $f \in C(\mathbb{R}_+ \times D, Y)$ ,  $D = D_A \cap D_B \neq \{0\}$ . The pencil  $\lambda A + B$ , associated with the linear part (left-hand side) of the ADAE, is called characteristic. It is known that any PDE can be represented in the form of an ADAE (possibly with a complementary boundary condition) in appropriate spaces. In this talk we consider the examples of PDEs which can be represented as the ADAE mentioned above and the conditions of their unique solvability, Lagrange stability and Lagrange instability. Also, we will discuss the dynamics of electrical circuits which are described by the higher-index DAEs. The talk is based on the work [<https://doi.org/10.48550/arXiv.2510.04433>].

### Affiliation

B. Verkin Institute for Low Temperature Physics and Engineering of the National Academy of Sciences of Ukraine

**Author:** FILIPKOVSKA, Mariia (B. Verkin Institute for Low Temperature Physics and Engineering of the National Academy of Sciences of Ukraine)

**Presenter:** FILIPKOVSKA, Mariia (B. Verkin Institute for Low Temperature Physics and Engineering of the National Academy of Sciences of Ukraine)

**Session Classification:** PDEs