

**PhD research topic proposal**  
**BME, Doctoral School of Mathematics and Computer Science**

**Name of supervisor :**

Lajos Molnár

**Degree:**

DSc

**Title of the topic:**

**Transformations on structures of matrices, operators, and functions**

**Short description:**

In Hermann Weyl's fundamental book "Symmetry" one can read the following famous sentences: "Whenever you have to do with a structure-endowed entity  $\Sigma$ , try to determine its group of automorphisms, the group of those element-wise transformations which leave all structural relations undisturbed. You can expect to gain a deep insight into the constitution of  $\Sigma$  in this way."

The proposed PhD research topic concerns the determination of the automorphisms/symmetries of structures of rather wide range which consist of matrices, linear operators or functions. The particular area we are interested in is now labeled by the term "preserver problems" and it represents a rather vivid research field on the border of functional analysis and linear algebra. Generally speaking, the central problem here is to describe the maps (called preservers which are kinds of symmetries) that preserve certain important characteristics (numerical quantities, relations, operations, etc.) of a given mathematical structure. Immediate and well-known examples for preservers are isometries (distance preserving maps) in various geometries, and algebraic automorphisms (operation preserving maps) in various parts of algebra.

In this doctoral topic we are concerned with structures which consists of matrices, linear operators, or scalar valued functions. Hence the research is connected to linear algebra, analysis, and functional analysis. Its aim is to contribute to and make developments in a chosen subfield of the area of preserver problems.

**Requirements:**

**Contact:**

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**Place of work:**

Department of Analysis, Institute of Mathematics, BME

**Statement:** *The conditions of the research above are satisfied, the theme is confirmed by the Head of the Department/Institute*