

FRAMEWORK PROGRAMME OF EARLY STAGE RESEARCHER TRAINING¹

1. BASIC DATA

Mentor's name and surname	Mislav Trbušić	Mentor's register number at ARIS (SICRIS) :	38215
Mentor's e-mail:	mislav.trbusic@um.si	Mentor's tel. no.:	040652204
Research programme (RP) leader's name and surname:	Marko Jesenik	RP leader's register number at ARIS (SICRIS) :	12623
Title of research programme:	Applied Electromagnetics	RP's Register number at ARIS (SICRIS) :	P2-0114
Research organisation (RO) of University of Maribor, where training shall be conducted:	Faculty of Electrical Engineering and Computer Science	RO Register number at ARIS (SICRIS) :	0552-0796
Research field according to ARIS classification :	2.12.01	Research field according to Ortelius classification (EURAXESS)	174

2. DEFINITION OF RESEARCH PROBLEM AND GOALS OF DOCTORAL RESEARCH²

Starting point of research task of the early stage researcher and its position in the research programme, where the mentor is included, work hypothesis, research goals and foreseen result with emphasis on an original contribution to science:

1. The young researcher will optimize the design procedures for a specific electromagnetic device.
2. Using numerical calculations based on the finite element method, the researcher will examine how various parameters and models affect the construction and functionality of the device in question.
3. By utilizing modern computer tools for designing electromagnetic devices, the researcher will develop a new and efficient design approach. This approach will incorporate numerically supported

¹ Term early stage researcher (ESR) is written in male form and used as neutral for women and men.

² Research and study programme of training have to harmonise with contents of the research programme, where the mentor is a member.

calculations, the introduction of new materials and models, optimization based on selected criteria, and automatic calculation of all relevant parameters.

4. The characteristics of modern electrotechnical materials will be considered during the numerical modeling of the device.

5. The developed procedure will be tested using a more complex electromagnetic device as a case study.

6. Appropriate measurements will support the verification of the developed model.

The young researcher's planned work aligns with the research program in Applied Electromagnetics, focusing on key thematic areas such as electromagnetic devices, numerical methods (including finite element methods), modern electrotechnical materials, and optimization techniques.

Working Hypothesis:

- The newly developed procedure for creating a specific electromagnetic device will lead to the production of a higher-quality device.
- By incorporating a numerical model that utilizes the finite element method, we will achieve more accurate calculations of electromagnetic quantities.
- The developed electromagnetic device will exhibit superior characteristics compared to existing models, resulting in measurable improvements.

Methods of Work:

- Familiarization with scientific research methodologies.
- Conducting literature searches and analyses, including scientific articles, monographs, books, etc.
- Engaging in scientific research within the framework of the assigned task, which involves using analytical mathematical models, modern numerical tools, various material models, optimization methods, and programming—including the integration of different software programs.
- Presenting research findings at conferences and publishing results in the form of articles.
- Adopting an innovative approach to problem-solving and independently seeking solutions.
- Familiarization with and utilization of measurement equipment used in the Laboratory of Applied Electromagnetics.

Research Objective:

The goal of this research is to develop and test an innovative design procedure to create an electromagnetic device that is comparable/superior to the performance of existing devices.

Original Contribution to Science:

This research aims to enhance the design process for a specific group of electromagnetic devices by developing and integrating analytical methods, numerical methods, and optimization techniques.

3. STUDY PROGRAMME

Foreseen study programme, to which early stage researcher shall be enrolled in academic year 2025/2026:

Electrical engineering - doctoral school (University of Maribor, Faculty of Electrical Engineering and Computer Science)

4. DESCRIPTION OF WORK AND TASKS

The young researcher will conduct research in the assigned field, which entails the following tasks: reviewing relevant literature, writing reports and scientific papers, editing documents, performing measurements and calculations, and fulfilling study requirements at the doctoral level. The candidate is also expected to participate occasionally in educational and training opportunities, both domestically and internationally, such as conferences, doctoral programs, symposia, and workshops.

5. REQUESTED LEVEL OF EDUCATION

Required education level VII/2 (Bologna Master's degree)

6. REQUESTED FIELD OF EDUCATION

Electrical Engineering (Power Electrical Engineering, Electronics, Automation), Physics, Mathematics, Computer Science

7. KLASIUS SRV

17003

8. KLASIUS P

0713

9. REQUESTED KNOWLEDGE

The candidate should possess in-depth knowledge of electrical engineering, electromagnetic theory, physics, mathematics, and programming. Proficiency in Microsoft Office tools (Word, Excel, PowerPoint) and familiarity with MATLAB is also required.

10. REQUESTED SPECIAL REQUIREMENTS

No special requirements are requested for this position.

11. REQUESTED LANGUAGES

Slovenian (fluent), English (C1)

12. REQUESTED WORK EXPERIENCE

Work experience is not required.

13. FORESEEN POSTDOCTORAL TRAINING

No postdoctoral training is foreseen.

Mentor's signature:

Research programme leader's signature:

Name and surname of Dean or
authorised person³:

Signature of dean or authorised person:

Place and date:

Stamp:

³ The training program is signed by the dean of the member where the ESR's employment and training will take place.