

## I. Personal and study details

Student's name: **Šimák Martin**

Personal ID number: **483523**

Faculty / Institute: **Faculty of Electrical Engineering**

Department / Institute: **Department of Electromagnetic Field**

Study program: **Electronics and Communications**

Specialisation: **Radio Communications and Systems**

## II. Master's thesis details

Master's thesis title in English:

**Dual Circularly Polarized Waveguide Antenna**

Master's thesis title in Czech:

**Duálně kruhově polarizovaná vlnovodová anténa**

Guidelines:

Research different polarizers in a metallic waveguide, consider round or square transversal shape of the guide. Inspired by circularly polarized patch antenna with chamfered corners, adapt this technique to the waveguide technology (the frequency should be used to be appropriate for easy fabrication, say around 5 GHz). Perform 2D eigenmode analysis of round and square waveguides with inserted metal triangles, and compare the results with the theory of patch antennas of such shapes. Choose one of the waveguide with the polarizer and optimize it to provide the best bandwidth and radiation properties, also design the transition from coaxial cable, preferably with the ability to excite both RHCP and LHCP patterns. Add a small horn (say 15 dBi) to the waveguide and finally optimise the whole structure. Build and measure the whole structure, compare to simulation results.

Bibliography / sources:

- 1/ Polarizers on sections of square waveguides with inner corner ridges | IEEE Conference Publication | IEEE Xplore
- 2/ Compact reconfigurable waveguide circular polarizer | IEEE Conference Publication | IEEE Xplore
- 3/ Design of Wideband Quad-Ridge Waveguide Polarizer | IEEE Conference Publication | IEEE Xplore
- 4/ Optimum-Iris-Set Concept for Waveguide Polarizers | IEEE Journals & Magazine | IEEE Xplore
- 5/ Novel square/rectangle waveguide septum polarizer | IEEE Conference Publication | IEEE Xplore
- 6/ Broadband Septum Polarizer With Triangular Common Port | IEEE Journals & Magazine | IEEE Xplore
- 7/ New Tunable Iris-Post Square Waveguide Polarizers for Satellite Information Systems | IEEE Conference Publication | IEEE Xplore
- 8/ Hexagonal waveguides: New class of waveguides for mm-wave circularly polarized horns | IEEE Conference Publication | IEEE Xplore
- 9/ Hexagonal Waveguide Based Circularly Polarized Horn Antennas for Sub-mm-Wave/Terahertz Band | IEEE Journals & Magazine | IEEE Xplore
- 10/ Bow-Tie-Shaped Radiating Element for Single and Dual Circular Polarization | IEEE Journals & Magazine | IEEE Xplore
- 11/ A Wideband Circularly Polarized Horn Antenna With a Tapered Elliptical Waveguide Polarizer | IEEE Journals & Magazine | IEEE Xplore

Name and workplace of master's thesis supervisor:

**doc. Ing. Pavel Hazdra, Ph.D. FEE CTU in Prague, K 13117**

Name and workplace of second master's thesis supervisor or consultant:

Date of master's thesis assignment: **04.09.2024**

Deadline for master's thesis submission: \_\_\_\_\_

Assignment valid until: **15.02.2026**

\_\_\_\_\_  
doc. Ing. Pavel Hazdra, Ph.D.  
Supervisor's signature

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Head of department's signature

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prof. Mgr. Petr Páta, Ph.D.  
Dean's signature

### III. Assignment receipt

The student acknowledges that the master's thesis is an individual work. The student must produce his thesis without the assistance of others, with the exception of provided consultations. Within the master's thesis, the author must state the names of consultants and include a list of references.

\_\_\_\_\_  
Date of assignment receipt

\_\_\_\_\_  
Student's signature