Characterization and optimization of the narrowband metamaterial waveguide filters

at

Laboratory of Wave Engineering

Start: ideally in September 2021

Supervisor: Prof. Romain Fleury

We, at LWE, have recently developed a new technique for routing and filtering microwave signals over subwavelength volumes, called composite pin-pipe waveguides (CPPWs), which are fabricated using additive manufacturing (AM) methods. Narrowband CPPW filters have ultra-small volumes, which causes high interaction of electromagnetic waves with the internal waveguide surfaces and higher attenuations due to material resistivity and surface roughness. Besides, in higher frequencies, the sensitivity of the RF parameters to the fabrication tolerances is considerable. In this project, we will perform:

- Sensitivity analysis of the passband and rejection bands of a CPPW filter against fabrication tolerances
- Developing new CPPW design for narrowband filters with lower insertion loss
- Optimization of the geometry using genetic algorithms or other advanced methods
- Reducing the effect of mesh noise in simulations

The project will be done with collaboration with MinWave SA, the spin-off from LWE and with the technical support of European Space Agency (ESA).

Preferred technical qualifications: Master student in electrical engineering, prior experience of electromagnetic software tools (CST, HFSS), good English

For questions on content: Please send your application (motivation letter, curriculum vitae, and transcript of records) via e-Mail to Maliheh Khatibi Moghaddam:
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For further information on LWE and its research, go to https://www.epfl.ch/labs/lwe/