Post-Doctoral Position

NEAR-FIELD DOSIMETRY FOR 5G AND BEYOND

Research environment

The research activities in biomedical electromagnetics of eWAVES research group (IETR/CNRS) cover a wide spectrum of fundamental and applied research spreading from multi-physics and multi-scale modeling to advanced technologies for body-centric wireless communications. Our research group was at the origin of pioneering innovations in biomedical electromagnetics, including the first millimeter-wave tissue-equivalent models, novel reflectivity based surface phantom concept, new broadband multi-physics characterization technique for Debye-type materials, innovative millimeter-wave textile antennas for smart clothes, ultra-robust miniature implantable UHF antennas, and the first millimeter-wave reverberation chamber.

Context

This post-doctoral research project focuses on near-field millimeter-wave human exposure assessment applied to 5G networks. Interaction of 5G terminals with the human body not only affects the wireless performance of the system but also requires careful consideration of user exposure to electromagnetic fields. This includes millimeter-wave exposure by wearable and mobile devices resulting in local absorption under near-field exposure conditions. The existing dosimetry approaches—originally developed for 3G/4G networks operating in sub-6 GHz range—are not directly scalable to millimeter-waves. This motivates research towards new solutions for accurate experimental dosimetry, in particular in 24 GHz and 60 GHz bands. This project builds on the unique scientific and technical expertise of the IETR in the fields of bioelectromagnetics and complex radiating systems.

Project overview

Existing experimental millimeter-wave dosimetry techniques are limited to electromagnetic field measurements using free-space probes in vicinity of wireless devices. These solutions do not account for the effects of the close vicinity to human body and therefore introduce significant error into estimated exposure levels. To overcome these limitations, this post-doctoral project will explore a novel approach for assessment of user exposure, addressing the fundamental challenges in terms of accurate, realistic, and fast dosimetry measurements at 5G frequencies above 10 GHz. The ultimate goal is to design a novel millimeter-wave dosimetry system prototype for measurements of the power density accounting for perturbation of the electromagnetic field radiated by a wireless device in presence of the human body.

Candidate

We seek for highly engaged and motivated candidates with a PhD degree in electro-magnetics, electrical engineering or electronics. The required skills and qualifications are:

- Strong background in electromagnetics, antenna design and microwave engineering. Knowledge in electronics and / or bioelectromagnetics is welcome but not mandatory.
- Knowledge of numerical modeling and experience with commercial or open-source numerical solvers (e.g. CST, Ansys, SIM4LIFE); programming skills (e.g. MATLAB).
- Fluency in English: the candidate should be conversant and articulate in English and must have strong writing skills. Knowledge of French is not required but would be appreciated.

How to apply

To apply please send your CV, motivation letter, reference letters (optional), and a copy of your PhD diploma to Dr. Maxim ZHADOBOV, CNRS Researcher (maxim.zhadobov@univ-rennes1.fr).