KInetic Testbed for PLASMa Environmental and Biological Applications (KIT-PLASMEBA)

Call for applications

Predictability in plasma science and engineering based on fundamental modelling has been considered a requirement for progress in the field, and model-based design for plasma processes has been identified as a necessary capability to achieve industrial goals, meaning that there is general agreement on the intellectual and technological importance of modelling low-temperature plasmas (LTPs). Substantial progresses were made in setting the basic model formulations and computational techniques describing LTPs. However, maintaining this route requires a community-wide change in its mode of operation, by borrowing best practices from other disciplines (e.g. keeping a close linking between theory and computation, implementing verification & validation (V&V) standards, distributing open-source codes, and supporting open-access databases). In recent years, plasma-based environmental and biological applications (EBA) have attracted the interest of pure and applied research, considering the flexibility and reactivity of plasma medium. Many of these studies have focused on R-N_2-O_2 plasmas (R being a rare gas, Ar or He), but still the wide sort of working conditions envisaged for EBA introduce new challenges while pursuing high-level quantitative predictions for the behaviour of these systems.

This project (with 36 months duration) aims developing a **KInetic Testbed for PLASMa Environmental and Biological Applications** (KIT-PLASMEBA, https://testplasmeba.wordpress.com/), embodying a **web-platform (KIT)** with state-of-the-art kinetic schemes, and a MATLAB® **kinetic code (LisbOn KInetics, LoKI)** with a modular structure, embedding a Boltzmann solver and a chemistry solver for the different gases/gas-mixtures considered here. LoKI provides the combined chemical and transport description of plasma charged / neutral species, both in volume and surface phases, for user-defined mixture compositions, pressure, radial dimension and excitation conditions.

The project is structured into the following topics / tasks
– Web-access platform construction and maintenance
– Documentation
– Boltzmann solver development
– Description of charged-particle transport
– Multi-species description of neutral transport
– Thermal model for the gas/plasma system
– KIT for rare gases (R=He/Ar), R-N2, R-O2 and R-N2-O2
– Validation tests

Grants available

Initial Research Grants (BIC)
Candidates should send an academic CV and a motivation letter to the contact person below. Selection might involve a personal interview. Work is to start in September 2016.

Post-doctoral Grants (BPD)
Candidates should send a CV, a motivation letter and recommendation letters to the contact person below. Selection might involve a personal interview (live or via Skype). Work is to start in September 2016.

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