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ONISILOS MSCA COFUND FELLOW

Πανεπιστήμιο Κύπρου
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ONISILOS

MSCA COFUND 2020

The ONISILOS research project focuses on developing an open-source computational platform to study cold atmospheric plasma jets and their potential use in biomedical applications, particularly in minimally invasive cancer therapies.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie Grant Agreement No 101034403

George Vafakos is a mechanical engineer specializing in computational fluid dynamics, plasma physics, and numerical modelling of multiphysics systems. He obtained his PhD from the Mechanical Engineering & Aeronautics department of the University of Patras, Greece, where his research focused on the development of computational models for cold atmospheric pressure plasmas and for in-flight aerodynamic flow control. His work has involved the development of numerical algorithms and simulation tools for complex electrodynamic and fluid systems, with applications in plasma actuators, magnetohydrodynamic flow for colling of fusion reactors and gas-surface interactions of atmospheric re-entry vehicles. His research interests include computational plasma physics, numerical methods for partial differential equations, thermodynamics, aerodynamics, and scientific computing. He is currently a Marie Skłodowska-Curie Actions (MSCA) COFUND Fellow at the Department of Mechanical & Manufacturing Engineering of the University of Cyprus. His ONISILOS research project focuses on developing an open-source computational platform to study cold atmospheric plasma jets and their potential use in biomedical applications, particularly in minimally invasive cancer therapies. These plasmas produce highly reactive chemical species that can interact with biological tissue and have shown promising ability to target cancer cells while limiting damage to healthy cells. Despite this potential, the physical and chemical processes governing plasma-tissue interactions are complex and not yet fully understood, as they involve the coupled behaviour of plasma chemistry, electromagnetic fields, and fluid flow.

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The project therefore develops advanced numerical models capable of describing the formation and propagation of discharges in helium plasma jets, and their interaction with biological targets. In parallel, machine learning techniques are explored to accelerate the computational solution of the underlying plasma equations, enabling faster simulation and analysis of plasma devices. The research is carried out within the In Silico Modelling Group at the University of Cyprus, under the supervision of Professor Vasileios Vavourakis.

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