Department of Chemical Engineering, University of Patras
Room XM6, Ground Floor, New Building
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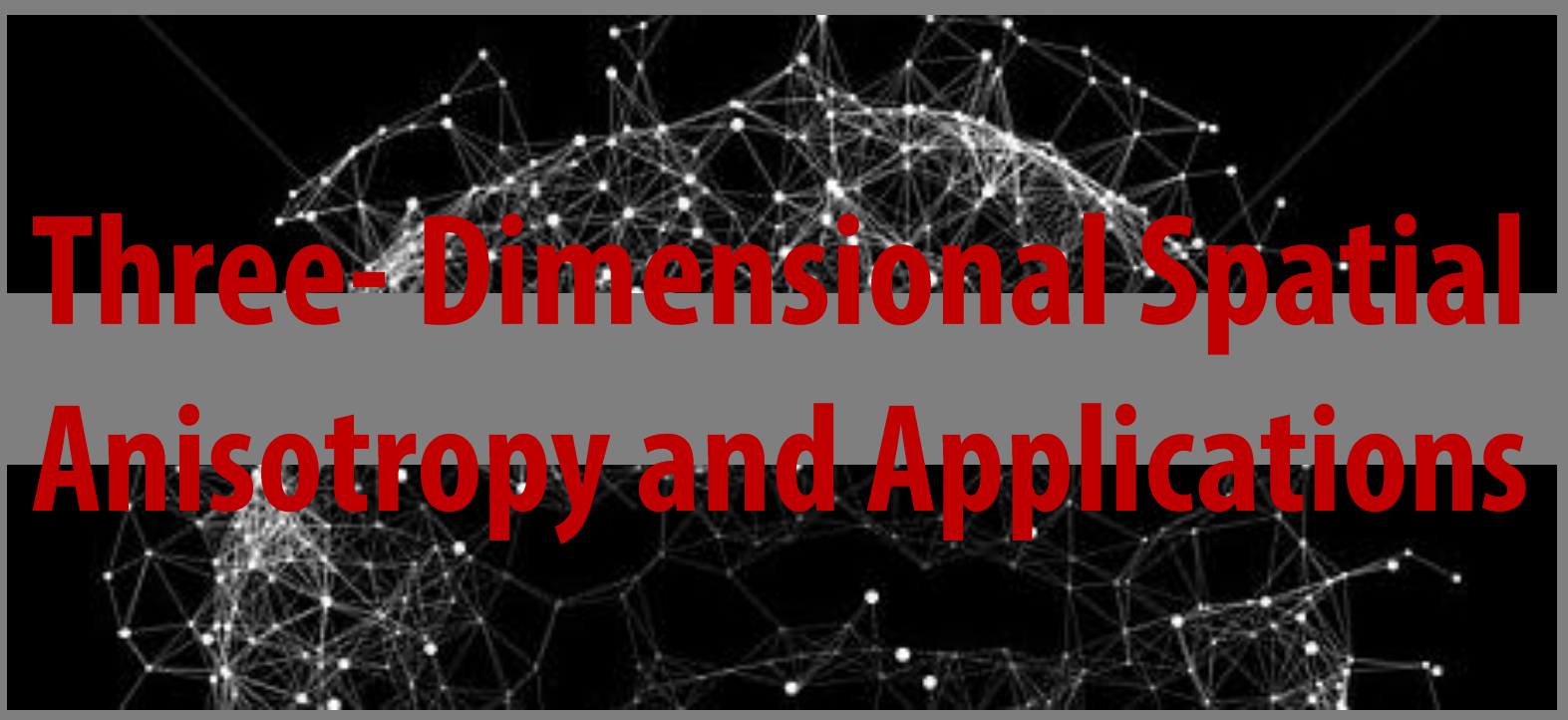
Panayiotis Vafeas



Three-Dimensional Spatial Anisotropy and Applications

The broad branch of mathematical physics is covered by a numerous boundary and initial value problems of mathematical and technological interest. Such problems are described by partial differential equations, accompanied by the appropriately fitting conditions within various domains, in which the basic orthogonal and curvilinear coordinate systems are applicable, either three–dimensional (3D), whereas the complete spatial anisotropy is secured or two–dimensional (2D), where the axisymmetric character of the space is reflected. The ellipsoidal coordinate system stands for the most general geometry, since it depicts the complete anisotropy of the three–dimensional space. Therefore, it is the most appropriate system for the description and solution of physical problems in three (3D) dimensions, where the ellipsoidal geometry is needed. Its in–depth geometrical and analytical study is necessary to address mathematical and technological problems with applications in various areas of physics and engineering, such as fluid mechanics, magnetohydrodynamics, electromagnetism and elasticity, but also in the wider area of medical biology, such as magnetoencephalography, electroencephalography and the growth of cancer tumours. The confrontation of such cases is based on the mathematical modeling of the relative physical problem and the use of analytical and / or hybrid methods, where the basic mathematical tools are necessary for their complete study.

Speaker
Panayiotis Vafeas

P. Vafeas was born in Patras on September 1, 1974 and he is married with two children. He was admitted to the Department of Chemical Engineering of the University of Patras in 1992 and completed his studies in 1997, taking his Diploma in Chemical Engineering. In 2003 he completed his postgraduate studies in the same department, acquiring a postgraduate Diploma in Simulation, Optimization and Process Control and obtaining a Ph.D. after completing his dissertation entitled "Theory of Differential Representations in Stokes Flow". In 2006 he was elected as a Lecturer at the Department of Engineering Sciences of the University of Patras and in 2011 he became an Assistant Professor in the same department. In 2013 he moved to the Department of Chemical Engineering of the University of Patras after the abolition of the Department of Engineering Sciences and in 2015 his position as Assistant Professor of the Department of Chemical Engineering became permanent, a post he maintains until today.

His teaching work from 2006 until today is self-contained and refers mainly to undergraduate courses in Linear Algebra, Differential and Integral Calculus of Functions, Ordinary Differential Equations, Partial Differential Equations and Complex Analysis in various Departments of the University of Patras, as well as to postgraduate courses in Applied Mathematics. His research activity mainly concerns the mathematical modeling of physical problems of mathematical and technological interest with applications in various areas of physics and engineering, such as fluid mechanics, magnetohydrodynamics, electromagnetism and elasticity, but also in the wider area of medical biology, such as magnetoencephalography, electroencephalography and the development of cancerous tumors. Mr Vafeas' activity in the Chemical Engineering Department is complemented by the execution of the necessary administrative tasks.