CMET SEMINAR

Center for Molecular & Engineering Thermodynamics

UNIVERSITY OF DELAWARE

Dr. Kostas Housiadas

Department of Mathematics

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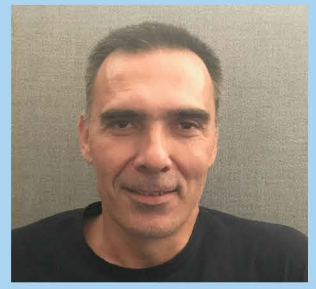

DATE:

September 11, 2017

TIME:

2:00 p.m.

LOCATION:

366 Colburn Lab

Prof. Kostas Housiadas has a B.S. and Ph.D. in Chemical Engineering (both awarded from University of Patras, Greece, in 1993 and 1999, respectively) and he has worked as a postdoctoral research associate at the Chemical Engineering at UD from 2001 to 2005. Since 2005 he has been in the faculty of the Department of Mathematics at the University of the Aegean, Greece. He has published about 50 refereed publications. He has been a frequent visiting professor at UD as well as at University of Sydney, Australia and at University of Cyprus, Cyprus. His research interests are in Theoretical and Computational Fluid Mechanics with emphasis in Non-Newtonian Rheology, Viscoelastic Flows and Processes, Turbulent Flows, Hydrodynamic Stability, Suspensions Rheology and others.

Flow Around Particles: Modelling, Analytical Techniques and Solutions

In this presentation, we discuss a variety of flow problems around spherical particles. Both Newtonian and viscoelastic fluids are considered. In the viscoelastic case, various constitutive equations are used to model the response of the viscoelastic fluid under deformation. The flow is creeping and isothermal and is shear- or elongation-dominated far from the particles (at infinity). Two different approaches are followed. In the first one, which is valid for dilute systems and for particles that do not interact with each other, the solution of the governing equations (systems of partial differential equations) is found analytically in series form using perturbation methods. The domain of validity of the derived series solutions increases substantially when many terms are found and suitably reprocessed with techniques which accelerate the series convergence. In the second approach, which is also valid for semi-concentrated and concentrated systems, a reference particle is considered and the effect of the rest of the particles is taken into account in the governing equations by introducing a modeling term (effective media techniques). The equations are solved analytically and the solutions are then used to find the bulk properties of the flow system.