Author : Joris Edelmann (Universität Magdeburg)

Title : Periodic self-propulsion of a swimmer

Abstract : A body immersed in a fluid (swimmer) can move by by shifting its centre of mass. We assume that the action is periodic and that the force acting on the body is mean-free. For simplicity, we assume that the problem has cylindrical symmetry. Considering a linear fluid-solid model, the body will exhibit oscillatory motion, but with a mean velocity of zero. This changes when nonlinearities by the Navier-Stokes equations are introduced.
We aim to identify configurations that lead to large average velocities. The numerical approximation of this problem is challenging due to two problems: First, the average velocity is always orders of magnitude smaller than the amplitude of the oscillation. Second, the transition of the dynamical problem to the periodic limit, where the average can be observed with certainty, can take many iterations. The convergence is slow because it depends only on the viscous damping, and usually convergence is not monotonic.
We present the numerical modeling of this problem using an ALE formulation of the fluid-solid interaction problem. We also present ideas and realizations to improve the convergence towards the periodic limit cycles. .

Author : Jerin Farin (Queen's University)

Title : On the Navier equations of elasticity with mixed boundary conditions

Abstract : In this poster, I will consider the so-called Navier equations of linear elasticity, modelling the deformation of an elastic solid. We impose mixed (Dirichlet and Neumann-type) boundary conditions on the solid's boundary. We will investigate the regularity of the solutions, and in particular of the stress on the boundary.

Author : Pietro Galimberti (Università di Modena e Reggio Emilia)

Title : New results for the Cahn-Hilliard equation with non-degenerate mobility: well-posedness and longtime behavior

Abstract : We study the Cahn-Hilliard equation with non-degenerate concentration-dependent mobility and logarithmic potential in two dimensions. We show that any weak solution is unique, exhibits propagation of uniform-in-time regularity, and stabilizes towards an equilibrium state of the Ginzburg-Landau free energy for large times. These results improve the state of the art dating back to a work by Barrett and Blowey. Our analysis relies on the combination of enhanced energy estimates, elliptic regularity theory and tools in critical Sobolev spaces.

Author : Vicente Ocqueteau (Université de Bordeaux)

Title : On the Small Oscillations of a Floating Cylinder

Abstract : We study a coupled PDE-ODE system modeling the small oscillations of a floating cylinder interacting with small water waves. The governing equations are formulated as an abstract wave-type equation on a suitable Hilbert space, and we establish the well-posedness of the associated initial value problem. A key element of the proof is the analysis of a partial Dirichlet-to-Neumann map on an unbounded domain with a non-smooth boundary.

Author : Lamis Sabbagh (Universität of Würzburg)

Existence and Uniqueness of Strong Solutions to Fluid-Structure Interaction System

Abstract : TBA