

## **Doctoral School of Information and Biomedical Technologies Polish Academy of Sciences**

### **Subject**

**Microparticles of complex structure moving in viscous fluids**

### **Supervisors, contact, place of research**

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### **Project Description**

The motivation for this project comes from modern research on modelling biological systems, such as bacteria or algae, design of medical applications, e. g. microgels to carry drugs, and investigations important to protect environment, for example, water-cleaning systems or diatom chains in oceans. The basic problem is to understand mechanical and physical principles of the many-body motion of microobjects in water-based systems.

In the project, microparticles of complex structure moving in viscous fluids will be investigated numerically. Basic features of the dynamics will be determined, taking into account complex shapes, different boundary conditions at the particle surfaces, elastic deformation, and many-body hydrodynamic interactions. To this goal, the advanced numerical codes Hydromultipole, developed in our Division, will be modified, optimized and applied. Hydromultipole codes have been already extensively used in various contexts in cooperation with scientists from many leading laboratories worldwide. The codes are based on advanced multipole method of solving the Stokes equations. The convergence of the multipole expansion is speed up by using the lubrication correction. The Rotne-Prager-Yamakawa and point-particle pairwise mobility matrices will also be applied in the numerical simulations.

### **Bibliography**

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updated: June 10, 2019