

Report on the activities of Pawel Bryk during his visit to the Institute of Condensed Matter of Ukrainian Academy of Sciences in Lviv. (23.11-23.12.2013)

During my stay in Lviv I carried out various scientific as well as teaching/learning activities together with members of the group of Prof. A. Trokhymchuk and Dr. T. Patsahan.

Scientific activities: During my stay in Lviv I was developing density functional theory (DFT) for two-dimensional polymeric fluids. The theory requires 2D radial distribution function (RDF) for hard spheres at contact as an input. As the first step the analytical formula for the contact value of RDF was derived from density functional theory. The obtained equation is in a good agreement with Monte Carlo simulations. This formula was subsequently used as an input to the calculations of the density profile of hard disk chains at a hard wall.

Preliminary results indicate a good agreement with Monte Carlo simulations.

However, more thorough tests are required.

Teaching/learning (transfer of knowledge) activities:

During my stay (23.11-23.12.2013) I gave a lecture on finite size scaling in confined geometries.

In addition I carried out several scientific discussions with Dr. Taras Patsahan about the adsorption of hard sphere fluid and the relation with Minkowski measures.

Dr. Volodymyr Shmotolokha explained to me how the scaled particle theory can be applied to describe thermodynamic properties of hard convex body fluid in random porous media.

I learned from Prof. M. Holovko about a method of solution of Ornstein-Zernike equations for hard-sphere Yukawa fluid involving Wiener-Hopf factorisation technique.

With Prof. Taras Bryk I discussed collective dynamics in binary liquid metallic alloys and its treatment within thermo-viscoelastic dynamic model, which Fuldy accounts for thermal excitations.