Langevin simulations in anomalous dynamics and the reverse engineering problem

O.Yu. Sliusarenko[a], V.Yu. Gonchar[a], A.V. Chechkin[a] and D.A. Surkov[b]

[a] *Akhiezer Institute for Theoretical Physics National Science Center "Kharkiv Institute of Physics and Technology", 1 Akademichna Str., Kharkiv 61108, Ukraine, E–mail: aslusarenko@kipt.kharkov.ua*

[b] *Karazin National University, Svobody Sq., Kharkiv 61077*

We suggest an introduction to the technique of anomalous dynamics simulations by using a generalized Langevin equations integration method, dwelling mostly on the case of Lévy-stable motion. With the help of this technique we obtain the stationary probability density functions (PDFs) in the symmetrical double-well quartic potential uncovering an interesting peculiarity in this system, that the peaks' coordinates of the PDFs do not coincide with potential's minimums. Also, a comparison of the results with those obtained via the numerical integration of generalized Fokker-Planck equation, as well as with analytical expressions, is given. Finally, we show the possibility to solve a reverse problem, that is to reconstruct the potential shape knowing the stationary PDF in the system.