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Education and Tutorial on Fluid Mechanics on the Basis of Computer Laboratory

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The paper presents experience in the education and tutorial in modeling of the diffusion, equilibrium stability and elementary flows, heat and mass transfer with the use of the computer system COMGA (COnvection in MicroGravity and Applications). This system provides modeling of the free and forced convection on the basis of the Navier–Stokes equations (the Boussinesq approach). It was developed and systematically used in the Laboratory of the Mathematical and Physical Modeling in Fluid Dynamics IPM RAS since early of the 90th. The computer laboratory as the intellectual shell of this system was realized on the last stage of the development. It includes the microgravity and ground-based applications with the use of high performance personal computers. A paper is focused on the basic aspects of fluid dynamics and heat/mass transfer such as hydrostatic equilibrium, stability of the steady flow, study of the elementary of the buoyancy-driven, surface-tension gradients driven and forced convecitve flows and multi-parametric analysis. Applied tutorial for microgravity fluid mechanics and technological fluid dynamics are also presented.

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