Hinode-3: 3rd Hinode Science Meeting
Hitotsubashi Memorial Hall, Tokyo
1–4 December, 2009

Realistic magnetohydrodynamic simulation of solar local supergranulation

Sergey D. Ustyugov

Keldysh Institute of Applied Mathematics

Abstract. I represent results three-dimensional numerical magnetohydrodynamic simulation of solar surface convection on scales local supergranulation with realistic model physics. I study effect of magnetic field on formation and growth of convective cells on different scales from granulation to supergranulation. I conduct calculation on portion of the solar photosphere extending 60 x 60 Mm horizontally and from 0 Mm down to 20 Mm below the visible surface of Sun. I apply equation of state and opacities of stellar matter and I take distribution by radius of all physical variables from Solar Standard Model. The equations of compressible radiation nonideal magnetohydrodynamics with dynamical viscosity and gravity are solved. The high order conservative PPML difference scheme for the ideal part of magnetohydrodynamics equations, the method of conservative short characteristic for the radiative transfer and dynamical viscosity from subgrid scale modeling are applied. The simulations are conducted on a uniform horizontal grid of 600 x 600, with 204 nonuniformly spaced vertical grid points, on 512 processors with distributed memory multiprocessors on supercomputer MBC100K in Computational Centre of Russian Academy of Sciences.