Hydrodynamic-type model of relaxing media

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We consider a mathematical model of geophysical medium, taking into account effects of temporal nonlocality. This model was derived by G. M. Lyakhov on pure machanical ground in late 70th of the XX century, and had been substantiated by V. A. Danylenko and co-workers a decade later within the framework of phenomenological thermodynamics of irreversible processes.

The set of travelling wave (self-similar) solutions of the modeling system is shown to possess a compacton-like solution, if an external force of specific form is present. In contrast to the classical compactons appearing in the Rosenau-Hyman equation, the compacton appearing in the model under consideration is manifested at specific values of the paremarters. In spite of such restriction, the compactly-supported travelling wave solution seems to be of interest, since it is shown to attract the near-by, not necessarily self-similar solutions. Using the numerical experiments, we show that solutions to Cauchy problems are attracted to the compacton if some energy criterion is fulfilled, regardless of the shape of initial data.

Lithosphere structure of the Black Sea basin from seismic tomography and 3D gravity analysis

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Black Sea Basin is a back-arc basin formed in the Latest Cretaceous (or at the Cretaceous-Palaeogene boundary) at the hinterland of the Pontide magmatic arc. At present the Black Sea Basin is a flat abyssal plain with the sea floor at a depth of 2 km, which overlaps two large sedimentary basins in the western and eastern parts of the sea (the West (WBS) and East Black Sea (EBS) Basins), filled with thick (up to 12—14 km) Cenozoic sediments. These two basins are separated by the Mid Black Sea Ridge — a NW-trended linear structure of the basement uplift. Thick sedimentary cover masks poorly investigated basement and heterogeneous crystalline crust that is most likely represented by a collage of different microplates and terranes of different affinities, welded together by accretion during the closure of Neotethys. Recent reinterpretation of some existed in the Black Sea profiles of deep seismic refraction study [Baranova et al., 2008; Yegorova et al., 2010] and new seismic experiment in the East Black Sea Basin [Shillington et al., 2009] have shown that the WBS and the EBS basins are underlain by high-velocity (6.6—7.0 km/s) thin oceanic and semi-oceanic crust of 5—7 km thickness confined by the Moho boundary placed at nearly 20 km depth.

Despite active geological and geophysical exploration of the study region, little is known about the structure of lithospheric mantle below the Black Sea Basin. This information, together with distribution of recent seismicity, is of crucial importance for understanding the geodynamic situation and governed tectonic processes in the region [Gobarenko, Yegorova, 2010; Yegorova, Gobarenko, 2010]. The present contribution deals with investigation of the velocity structure of the Black Sea lithosphere by seismic tomography using the data from earthquakes occurred inside the study region and recorded by seismic sta-