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Kuiper Belt Objects of different sizes and average densities: thermal evolution scenarios and modern structure of matter

O.B. Shchuko (1), S.D. Shchuko (2), D. Kartashov (3), and R. Orosei (4)

(1) NIRFI, Nizhny Novgorod, Russian Federation (obsd3336@yandex.ru), (2) State Technical University, Nizhny Novgorod, Russian Federation (obsd3336@yandex.ru), (3) Photonic Institute Vienna University of Technology, Vienna, Austria (daniil.kartashov@tuwien.ac.at)), (4) Istituto di Fisica dello Spazio Interplanetario, Rome, Italy (roberto.orosei@ifsi-roma.inaf.it)

Thermal evolution of accretion-formed Kuiper Belt Objects (KBOs) with modern sizes from 200 to 2000 km and average densities from 1100 to 3200 kg/m^3 has been studied by mathematical simulation methods. The values range of physical parameters of the accretion material and ultimate radionuclide content, securing KBO existence at present, have been found.

The solid dust material of protosolar cloud fringe regions and fine-fractured H_2O condensate in the form of amorphous ice are considered to have been the building matter for these objects. This material was represented by small dust particles of different chemical and mineralogical composition, embedded with radionuclides ^{238}U, ^{235}U, ^{232}Th, ^{40}K providing the sources of radiogenic heat.

H_2O condensate secured the presence of amorphous ice in the forming body's matter. Radiogenic heat leads to H_2O phase transitions which define a body's interior matter differentiation. The radionuclide content at the initial time of the body formation determined the dynamically changing degree of the interior matter differentiation at different KBO depths for the whole period from the initial up to the present time.

For the models of the celestial objects considered, the dynamically changing boundaries of spherically symmetric regions with different degree of matter differentiation have been determined.