Thermal convection in closed container filled with a fuel component in three-phase states

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The mathematical model for calculation of pressure in upright closed cylindrical container filled partly by cryogenic fuel component in three phase states during non-drainage storage is under consideration. Conjugate problem of calculation of temperature and hydraulic fields in vapor and liquid with moving liquid-sludge boundary and immovable liquid- vapor boundary is solved. The heat motion along the container walls is taken into account. To solve the problem, it is assumed that vapor can be described by the ideal gas law. Sludge is supposed to be isothermal and its melting temperature is equal to the solid phase melting temperature. At the initial time vapor and liquid are supposed to be immovable and having the triple point temperature and pressure. Vapor and pure liquid temperature and velocity fields can be determined from Navier-Stokes equations written as Boissinesq approximation in variables "vortex - flow function". The problem has been solved numerically on the basis of the net-point method explicit scheme.

Keywords: *cryogenic liquid, cryogenic product, non-drainage storage, vapor, liquid, sludge, melting, evaporation, vortex, flow function.*

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