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MODELING THE DEVELOPMENT OF RAYLEIGH-TAYLOR INSTABILITY IN A SPHERICAL LAYER OF INCOMPRESSIBLE FLUID *)

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In [1-4] the formulation is formulated and particular solutions are obtained in the problem of the development of Rayleigh-Taylor instability in a spherical layer of incompressible fluid. Below (see (1)) are the main equations describing the dynamics of a shell of incompressible fluid taking into account the evaporation of the outer layers under the action of: $P_{out}(t)$, $P_{in}(t)$ – external and internal pressures. D(t) – mass rate of evaporation of a substance, $R_1(t)$, $R_2(t)$ – inner and outer radii, ρ-density of the shell substance. Results of simulations illustrate Fig.1.

$$R_2 = \sqrt[3]{R_1^3 + 3W(t)}; \qquad Z = \frac{R_1(t)}{R_2(t)}; \qquad \frac{\partial V_1}{\partial t} = -\left\{2 - \frac{0\left(1Z^4-\right).5}{1-Z}\right\} * \frac{V_1^2}{R_1} - \frac{P_{out}-P_{in}}{R_1(1-Z)*\rho} \qquad (1)$$

$\frac{dW}{dt} = -R_2^2 D(t)$, $W(t) = (R_2^3(t) - R_1^3(t))/3$ -volume of a spherical layer of 1 steradian.

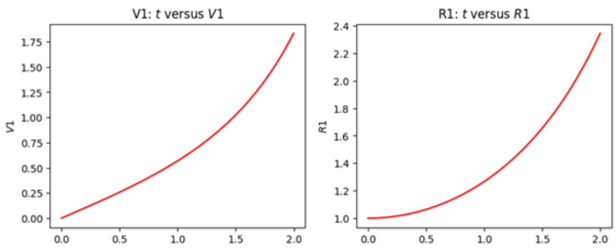

Figure 1. Graphs of growth of internal radius and speed.

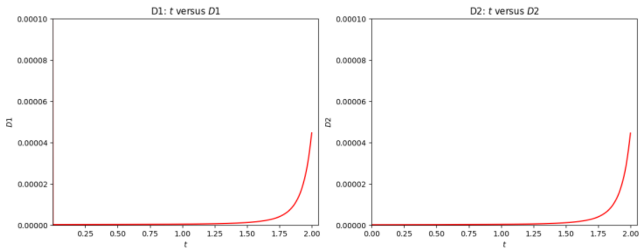

Figure 2. Growth of disturbance amplitude on the inner boundary of the shell during its accelerated expansion. Harmonic number n=10.

Evolution of small perturbations of the internal $(\Delta_1(t) \cdot P_n(\theta,\varphi))$ and external $(\Delta_2(t) \cdot P_n(\theta,\varphi))$ shell boundaries (here $P_n(\theta,\varphi) - is\ a\ spherical\ harmonic$) is described by equations (see [2-4])

The system of equations was solved numerically by the Runge-Kutta method.

The results are given for the case $P_{out}(t)=0$, $P_{in}(t)=1$, $As=R_{20}/(R_{20}-R_{10})=10$, $\rho_{in}=\rho_2=0$, $\rho_0=1$, $\delta P=0$, $D=0$, $\Delta_1^0 = 0.0001$, $\Delta_2^0 = 0.0$ *(see fig.2)*

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