strong electric field the state of a fluid moves through metastable states to an unstable state. Hence, an anisotropic decay of the liquid into a two-phase system of vapor filaments in a liquid [1] becomes possible in that region. Characteristic time of the density decrease to the minimal value for the point radius of 10 micrometers is of order of 10 nanoseconds. Such flows with shock waves and instabilities were obtained in simulations.

When the electrode surface is rough, electric field is enhanced ahead of protrusions. The electrostriction forces pull the liquid towards protrusions, and the rarefaction waves arise. If two protrusions are located sufficiently close, the interaction of rarefaction waves produces a region with low density. Interestingly, the ratio of the electric field strength to the density of a liquid E/ρ which determines the probability of electric breakdown according to the Pashen's law, takes the maximal value in this low-density region. In our simulations, the value of E/ρ increases by more than an order of magnitude. Such effect could be a new mechanism of the inception of electric breakdown of dielectric liquids.

1. A. L. Kupershtokh, D. A. Medvedev, Phys. Rev. E **74**, 021505 (2006).

THERMAL LOCALLY-NONEQUILIBRIUM PROPERTIES OF AN UNDERCOOLED MELT

***Shablovsky O. N.**, Kroll D. G.*

Gomel State Technical University, Belarus

**shabl@gstu.gomel.by*

Thermophysical interpretation of experimental dependences "melt undercooling–crystal growth velocity" for Ni, Cu and Ge is presented. The algorithm is based on the model of locally-nonequilibrium heat transfer at high-rate crystallization. Calculations were carried out at subcritical and supercritical undercoolings. The choice of thermodynamically admissible velocity of crystal growth is based on the account of alternating nonlinearity of the state function. The relaxation time of the heat flux on a phase boundary proved out to be an effective parameter of correlation between theory and experiments. The approach proposed is valid for not too small undercoolings. Thermophysical properties of Ni, Cu and Ge are represented by semi-empirical functions. A maximum of the entropy production as a function of a heat flux jump is present in all studied points. A dependence of the kinetic growth coefficient on melt undercooling is found.