Interfacial Phenomena in Microgravity Conditions Considering Surface Deformation, Vibrational Action and the Soret Effect

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Project details

<table>
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<tr>
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<tr>
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<td>1A - Nuclear Physics, Astronomy, Astrophysics</td>
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<td>Coordinated in:</td>
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Objective

This section briefly summarizes the basic ideas behind the research of the project and the expected results.

It is intended to study
- liquid behaviour in micro-gravity conditions under the complex action of various factors - the thermo-capillary and concentration capillary effects, and the influence of vibration forces with consideration of surface deformation and cross-effects resulting from multi-component nature of the examined liquid;
- surface deformations, which are related to the initiation of Marangoni convection and can lead to wave generation and layer breaking;
- the influence of high frequency vibrations on the Marangoni instability of multi-layer structures in multi-component immiscible liquids;
- the influence of the cross-effects, including the Soret effect, on Marangoni convection and the Marangoni instability;
- the conditions of mechanical equilibrium of a binary mixture drop in a surrounding medium, the Marangoni flows inside/outside of the drop and the motion of the drop itself.

It is projected to elaborate:
- new theoretical approaches and experimental methods in order to find solutions to the stated problems; in this context, to develop the averaged equations governing the Marangoni convection in terms of the non-Boussinesq approximation. Points of scientific interest include the investigation of:
- the structure of thermo-capillary convection in the vicinity of a meniscus and conditions for the initiation of oscillatory flow regimes, the characteristic features of the interaction of meniscus oscillations with the surface waves;
- the averaged equations of vibration-thermo-capillary convection in the case when the Boussinesque approximation is not valid;
- the structure of thermocapillary convection in multi-layer systems and its response to high frequency vibrations, the critical parameters for transitions between different convection regimes;
- the conditions of the stability of diffusive mass transfer of a surfactant from drops to a surrounding medium with respect to drifting monotonous and oscillating disturbances taking into account the main surface effects and complicating surface factors.

Based on the obtained results it is intended:
- to prepare micro-gravity experiment proposals;
- to prepare recommendation for updating the technology of crystal growth.
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**Subjects**
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