

PROCEEDINGS

Mechanics of Multiphase Media Under Hyper-gravity Conditions

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ABSTRACT

With the energetic development of aerospace and aviation industries of our country, it is a critical and onerous mission to protect the life and health of astronauts and aviators. It is already demonstrated in the real flight or centrifuge test that several living organisms would suffer large deformations, instability or even damages under extreme hyper-gravity environment. To overcome the shortcomings from those direct experimental measurements in the literature, the present project will establish a theoretical framework to investigate the deformation and buckling of composite materials or structures systems under hyper-gravity effect. In the meantime, a centrifuge platform is built to create hyper-gravity environment to conduct instability experiments on soft materials or multiphase flows. In addition, theoretical and numerical models is established for the movement of multiphase flow and large deformation of soft materials with hyper-gravity effect. Finally, the concept of soft composites is employed by inserting fibers or particulates into soft substrate, whose microscale parameters, such as dimension, geometrical layout and surface tension, etc., are tailored to study the effect on the deformation of soft composite materials with hyper-gravity effect. We hope the present project will provide new insights on the research and development of biomaterials for aerospace and aviation industries.

KEYWORDS

Multiphase media; hypergravity effect; deformation; buckling

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