

KOLLOQUIUM ÜBER NEUERE ARBEITEN AUF DEM GEBIETE
DER MECHANIK UND STRÖMUNGSLEHRE
an der Technischen Universität Wien

EINLADUNG

zum Vortrag von Herrn

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über

**"On thermocapillary-driven convection in half-zone liquid bridge
– on-orbit experiments in the Japanese Experiment Module ‘Kibo’
aboard the International Space Station"**

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On thermocapillary-driven convection in half-zone liquid bridge
- on-orbit experiments in the Japanese Experiment Module 'Kibo' aboard the
International Space Station -

Ichiro UENO (Tokyo University of Science)

The long-duration fluid physics experiments on a thermocapillary-driven flow had been carried out on the Japanese experiment module 'Kibo' aboard the International Space Station (ISS) since 2008. In these experiments, various aspects of thermocapillary convection in a half-zone (HZ) liquid bridge of high Prandtl number fluid over 200 have been examined under the advantages of the long-duration high-quality microgravity environment. We especially paid our special attention to the onset condition of three-dimensional time-dependent 'oscillatory' flow, and flow patterns realized after the onset inside the liquid bridge. In 2010, we succeeded to realize a series of nonlinear convective fields in the HZ liquid bridge of rather large aspect ratio defined as height/radius greater than or equal to 2.0. The special attention was paid upon to the complex convective fields, especially the behaviors of the hydrothermal waves (HTW) over the free surface visualized by an infrared camera. In order to evaluate the characteristics of the nonlinear convective behaviors and their transition processes, we indicate the fabricated images describe the time evolution of HTW, the spatio-temporal diagram, the Fourier analysis and the pseudo phase space reconstructed from the time series of the scalar information of the liquid bridge, that is, surface temperature variation. In the presentation, unexpected situations during the operation in the ISS as well as the series of preparation research for the on-orbit experiments will be also introduced.