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*Computational Science & Engineering Laboratory: Prof. P. Koumoutsakos*

24/10/2014

# E I N L A D U N G

zu einem Vortrag im Rahmen des

## Kolloquiums Thermo- und Fluiddynamik

**Datum:** **Mittwoch, 29. Oktober 2014**

**Zeit:** ***>> 09:15 Uhr <<***

**Ort:** Maschinenlaboratorium ETH Zürich
***>> Hörsaal ML H 37.1 <<***

**Referent:** **Dr. Yeping Yuan**
Ocean College at the Zhejiang University &
Georgia Coastal Ecosystems LTER, University of Georgia, Athens, USA

**Titel:** **Laboratory Investigation of Buoyant River Plumes**

Dr. Yeping Yuan investigated the nature of physical processes associated with buoyant river plumes under the impacts of rotation, lateral spreading and upstream conditions. Two sets of laboratory experiments, one focused on the whole rotating buoyant plume, and the other zoomed into the near field plume, are studied. The vertical turbulent buoyancy flux is determined using a control volume approach with velocity and density fields derived from combined particle image velocimetry (PIV) and planar-laser-induced fluorescence (PLIF). Lateral spreading is determined in the unconfined experiments based on plan-view imaging using the optical thickness method (OTM). Based on the experimental data, I find that lateral spreading dramatically modifies the plume structure; the spreading plume layer consists of approximately linear density and velocity profiles that extend to the surface, whereas the channelized plume profiles are uniform near the surface. The experiments suggest that spreading does not appreciably alter the turbulent mixing processes at the base of the plume. However, it significantly increases the area over which this mixing occurs and, through this mechanism, increases the net dilution of river water at a fixed distance from the river mouth. I hypothesize that the spreading does not significantly increase the local turbulent buoyancy flux because spreading occurs preferentially near the surface, whereas buoyancy flux is greatest in the core of the current. On the other hand, lateral spreading dramatically modifies the instabilities at the shear layer. With the lateral spreading taken into account, the interface fits the solution of the most unstable mode of the Taylor-Goldstein equation while the braid regions of the primary instabilities are favorable for secondary instabilities generation.

Dr. Yeping Yuan is an assistant professor in the Ocean College at the Zhejiang University, China. Her research interests include estuarine and coastal dynamics, cross-shelf transports, mesoscale eddy dynamics. Dr. Yuan received her Ph.D. from University of Washington, in 2013, working on the laboratory investigation on buoyant river plume dynamics. She is currently working on estimating ocean currents and studying the impact of the Gulf Stream at South Atlantic Bight using Altimetry data. In 2014, Dr. Yuan received the Lorentz G. Straub reward for the best Ph.D. thesis in the USA in the field of hydraulics.

*Host: Prof. P. Koumoutsakos*

**Gäste sind willkommen!**

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