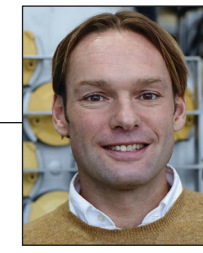
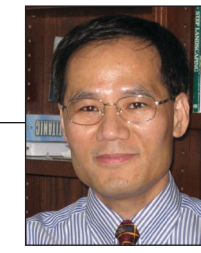
Guest Editorial





PAUL KROCHAK
Guest Editor

J.Y. ZHU
***TJ* Editorial Board**

Highlighting the role of fluid mechanics

Editor's Note: *TAPPI would like to thank Paul Krochak of Innventia and J.Y. Zhu of the* TAPPI JOURNAL (TJ) *Editorial Board for selecting papers from the TAPPI's 2013 and 2014 PaperCon Conferences and overseeing their peer review for this special Fluid Mechanics issue. Thanks also to the authors and peer reviewers who participated in this process.*

– **Monica Shaw**, Editorial Director

Fluid mechanics plays an important role in papermaking, from forming to water removal. The interactions at different scales between water and fibers influence the rheology of the process streams. Fiber orientation and distribution, along with the mixing of fibers and chemicals and other additives during forming, are dictated by process flow behavior to affect paper property. Moreover, flow properties resulting from fiber and stock characteristics, processing conditions, and equipment configurations also affect water removal efficiency.

This special edition of *TAPPI JOURNAL* highlights several presentations from PaperCon 2013 and 2014 on many of the key fluid mechanics phenomena and their effects on papermaking.

Retention aids

A paper from Krochak et al. (p. 311) studied use of computational fluid dynamics to improve the understanding of retention aids addition and mixing, and interaction of retention aids and polymers with fluid flow to affect rheology. Such studies can help in developing optimal dosage strategies to achieve better mixing quality.

Microfibrillated cellulose

The subject of new approaches for dewatering of nanocellulose-containing suspensions is also investigated in this issue by papers from Haavisto et al. (p. 291) and Kopenen et al. (p. 325) of the VTT Technical Research Centre in Finland. Cellulose nanofibrils (CNF) and microfibrillated cellulose (MFC) for papermaking applications have attracted considerable attention in recent years, but certain challenges exist with their use.

Web dewatering is a key component of production efficiency, as it helps reduce the load on the energy intensive dryer section. However, dewatering efficiency is dependent on fiber type, morphology, and refining level. Moreover, MFC containing stocks are difficult to dewater. The Kopenen study shows that varying pressure profiles during dewatering was effective for various furnishes. It also showed that, surprisingly, addition of MFC only slightly increased final solids content in handsheets.

The Haavisto study presented a novel technique of optical coherence tomography for studying the flow and rheology of MFC suspensions. This study provided a new understanding of the aggregation behavior of MFC.

Drainage

For mills with slow draining pulps, conventional freeness testers may not provide the best measurements. Lavrykov and Ramarao (p. 305) used multiphase flow theory to analyze drainage in a laboratory scale testing device, demonstrating that it can yield specific surface area and specific volume of the particles. These measures scaled appropriately for slow draining suspensions and can be used in cases where freeness fails.

Tissue

Anukul, Khantayanuwong, and Somboon (p. 339) of Kasetsart University in Thailand developed a novel laboratory method for wet creping of tissue that produced sheets with softness close to that of industrial products. Their research showed that physical and mechanical properties could be differentiated between different pulps and various degrees of refining.

We hope the studies presented in this issue can provide you with some new insights into the fundamental and applied aspects of fluid mechanics in papermaking. Finally, we would like to acknowledge the timely contribution of the authors to this issue. We especially appreciate the reviewers for in-depth knowledge and comments in improving the quality of the manuscripts. **TJ**

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