



Guest Editorial

Special Section on Flow Physics of Supercritical Fluids in Engineering

Supercritical-fluid applications have recently received extensive attention. Applications of supercritical flows include thermal power generation, cooling of scramjet engines, highly efficient compact power systems, concentrated solar power, nuclear power, geothermal energy, refrigeration systems, and waste-heat utilization systems.

Supercritical flow characteristics, particularly for the region in the vicinity of the pseudo-critical point, need to be investigated and analyzed to better understand the distinguished behavior of these flows, such as heat transfer deterioration and enhancement. Therefore, the main motivation of this special section of the *ASME Journal of Fluids Engineering* is to bring together original articles on recent developments in the field of supercritical fluids in engineering applications. After careful reviews of all the submissions, three papers were finally accepted for this special section.

The papers selected include an experimental study of bulk-mode thermoacoustic instabilities of supercritical methanol flowing in a heated tube, a numerical study of the turbulent heat transfer of natural gas in a heat exchanger during trans-critical liquefaction, and a study using the buoyancy parameter to understand the deterioration of heat transfer to or from upward supercritical fluid flows. We hope this special section raises the impact and application of supercritical fluids in the industry while helping the visibility of the *ASME Journal of Fluids Engineering*.

Although research on supercritical flow and heat transfer is very attractive and has received much attention, it is hardly possible for this section to cover most related topics. Some other important topics, such as asymmetrical heat flux condition, conjugate heat transfer in heat exchangers, new turbulence models for supercritical flows, microgravity environment, and accelerating/decelerating state are not presented here.

Finally, we would like to thank the Editor-in-Chief of the *ASME Journal of Fluids Engineering*, Professor Francine Battaglia, for giving us the opportunity to edit the special section on a high-impact topic. We also thank the Assistant to the Editor-in-Chief, Ms. Colette Montague, for her technical support. Finally,

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