



DEPARTMENT OF MECHANICAL ENGINEERING

SPECIAL SEMINAR

*to be held on Tuesday, February 26, 2019, 11:00
in the Seminar Room (#117) of the Mechanical Engineering Building (#55)
at the Campus of the Ben-Gurion University of the Negev*

NANOFLUIDS WHAT WORKS WHAT DOESN'T?

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Abstract:

Nanofluids – suspensions containing particles with sizes ranging from 10 to 100 nm – seem to be a new option to increase heat transfer. Production, characterisation and thermodynamical tests are underway to prepare these special fluids for industrial applications. This overview presents research done at ILK Dresden employing nanofluids as heat carrier in pipe flows and as working fluid in heat pipes and thermosyphons.

In the first part the talk focuses on the question: What can we expect from substituting ordinary heat carrier like water by nanofluids with enhanced thermal conductivity? In the presented test case – laminar pipe flow with twisted tape – increase of thermal conductivity is obtained by adding titania nanoparticles to water. It is shown, that the enhancement of the heat transfer coefficient equals the amount the thermal conductivity increase. Equivalent experiments for laminar and turbulent pipe flow, for coil and plate heat exchangers as well as for counter flow heat exchangers carried out at different European institutions confirm this finding.

With the second part of the presentation applications of nanofluids in heat pipes are discussed. While experiments indicate that nanofluid application in heat pipes are rather critical due to blocking of the wick it seems favourable to employ them as working fluids of thermosyphons. However, physical effect are tricky because boiling of nanofluids is massively affected by surfactants or dispersants which are added to these special fluids to stabilise them against agglomeration.

The presentation ends with some short information on NANOUP TAKE the European network on nanofluid research.

Bio: Matthias H. Buschmann is a senior researcher at the Institute für Luft- und Kältetechnik Dresden (ILK) and senior lecturer for vehicle aerodynamics at University of Dresden, Saxony, Germany. He is a theoretician in fluid mechanics but also highly interested in heat transfer experiments.

He received his PhD and habilitation at University of Dresden, where he worked as research assistant before joining ILK about 15 years ago. M. Buschmann studied at the Universities of Dresden, Karlsruhe (Germany) and Melbourne (Australia). His research interests include phase change heat transfer, multiphase heat and mass transfer, nanofluid flow and heat transfer and wall bounded turbulence. He has contributed to more than 30 full papers and numerous conference papers. He is currently working on the influence of fractal turbulence on condensation and instantaneous phenomena occurring in thermosyphons operated with nanofluids.

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