

## MATHEMATICAL MODELING OF HEAT AND MASS TRANSFER IN PHASE CHANGE MATERIALS DURING MELTING/SOLIDIFICATION

Mikhail A. Sheremet

Tomsk State University, Tomsk, Russia

§Correspondence author. Email: sheremet@math.tsu.ru

### ABSTRACT

Nowadays, phase change materials (PCM) are widely used in different engineering systems for thermal energy accumulation, cooling of heat-generating elements, building thermal performance enhancement and others. One of the main problems related to PCM application is a low thermal conductivity of PCM and for an improvement of thermal properties it is possible to use metal foam with extended heat transfer surface, solid or porous fins, metal or metal oxide additives. Advantages and disadvantages of these techniques can be defined using the mathematical modeling of heat and mass transfer in PCM with phase changes. The objective of the present report is to illustrate the mathematical modeling techniques for solution of the Stefan problem in the case of heat transfer with phase changes. Some interesting and useful results on PCM thermal properties enhancement using metal foam, fins or metal additives will be discussed.

### Short Biography



Dr. Mikhail Sheremet is a Head of the Laboratory on Convective Heat and Mass Transfer and Head of the Department of Theoretical Mechanics at the Tomsk State University. He received the Candidate of Sciences in Physics and Mathematics degree from Tomsk State University (2006), and Habilitation (Russia, Doctor of Sciences in Physics and Mathematics, 2012) from Tomsk State University. Dr. Sheremet has published over 480 papers in peer-reviewed journals and conference proceedings, and contributed to several books. He obtained the Web of Science Award 2017 in the category of Highly Cited Researcher in Russia. He is Highly Cited Researcher in the field of Cross-Field-2021 (Clarivate Analytics). He is #239 in the world ranking and #1 in Russia based on the 2023 Edition of the Ranking of Top 1000 Scientists in the area of Mechanical and Aerospace Engineering (Research.com). He was enlisted in 2018–2023 Top 2% Scientists of the World by Stanford University. He is a member of Editorial Board of International Journal of Numerical Methods for Heat & Fluid Flow, Alexandria Engineering Journal and other journals. He is a member of the Scientific Council of the International Centre for Heat and Mass Transfer.