ADVANCES IN NUMERICAL METHODS FOR CONTACT MECHANICS: ADDRESSING TRIBOLOGICAL CHALLENGES

C. FERNANDES[*]

[*] Transport Phenomena Research Center (CEFT), Department of Mechanical Engineering,
Faculty of Engineering at the University of Porto (FEUP)
Rua Dr. Roberto Frias s/n, 4200-465 Porto, Portugal
cbpf@fe.up.pt

ABSTRACT

The mini-symposium titled "Advances in Numerical Methods for Contact Mechanics: Addressing Tribological Challenges" aims to bring together researchers to discuss the latest developments and innovative approaches in numerical modeling of contact mechanics with a focus on tribological effects. Contact problems in engineering systems are often complicated by tribological phenomena such as wear, adhesion, and friction, which significantly impact the performance, reliability, and longevity of mechanical components and systems.

The objectives of this mini-symposium are to provide a comprehensive overview of state-of-the-art numerical methods and computational techniques used to model and analyze contact mechanics in the presence of tribological effects; highlight recent advancements in the understanding and prediction of wear mechanisms, adhesive interactions, and frictional behavior through numerical simulations; facilitate the exchange of ideas and foster collaboration among researchers from various disciplines, including mechanical engineering, materials science, and applied mathematics; and identify current challenges and future research directions in the numerical analysis of contact problems with tribological considerations.

Topics to be covered in this mini-symposium include, but are not limited to:

- Finite element methods (FEM) and boundary element methods (BEM) for contact and tribological problems.

- Numerical techniques for simulating wear processes and predicting wear life of materials and components.

- Modeling of adhesive contact and its implications on material behavior and system performance.

- Advanced algorithms for frictional contact analysis, including the effects of surface roughness and lubrication.

- Applications of numerical methods in industry, such as in automotive, aerospace, and biomedical engineering.