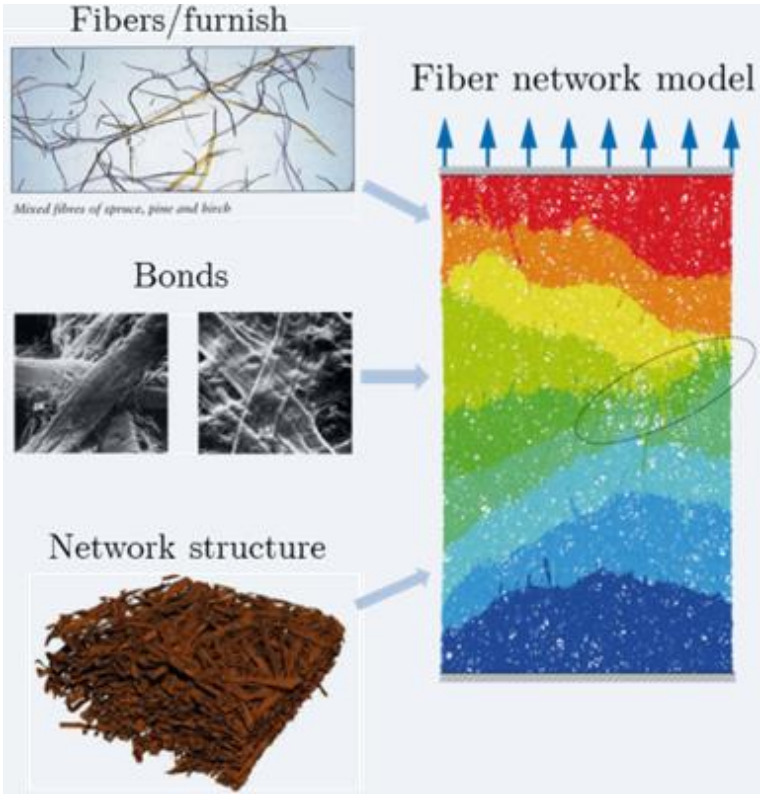
KTH SOLID MECHANICS SEMINAR; Tuesday, April 23rd, 16.15; https://kth-se.zoom.us/j/69795748159

Artem Kulachenko's KTH Solid Mechanics seminar "Micromechanics of fiber networks. Applications to paper and packaging materials"

We are surrounded by fiber-based materials such as paper, packaging, and biological tissues. The mechanical properties of these materials are extremely relevant in many applications related to production and end-use.

Strength and stiffness of fiber-based material depend on several factors, including fiber and bonding properties, network topology, fiber orientation, etc. All these parameters are subjected to variations over the network and getting reliable statistical data describing these variations is a formidable task as the tools for performing the mechanical and structural characterizations on the fiber scale are not yet developed to the required extent. The underexplored research areas include thermal/hygro-expansion properties, compressive failure, stochastic variability in strength resulting in size dependencies and difficulties to predict the lifetime of the products made of paper material.

In this presentation, we will discuss the nagging challenges related to mechanical properties, dimensional stability, and fracture mechanics of fiber-based material. We will present experimental and numerical techniques that can be used to address them effectively on a micromechanical level.



Artem Kulachenko graduated from the National Technical University (KhPI) in Ukraine in 2001. He later pursued PhD in Solid Mechanics at the Mid Sweden University in association with KTH Royal Institute of Technology in Stockholm. His thesis was titled "Mechanics of Paper Webs in Printing Press Applications". After received a PhD in 2006, he worked at KCL and VTT Technical Research Centre of Finland with problems related to paper mechanics in close collaboration with the pulp and paper industry. Prof. Kulachenko returned to Sweden in 2010 and started working at KTH. His research interests currently include micromechanics of fiber network materials, axially moving systems, soft matters, mechanical degradation of the lithium-ion batteries. Prof. Kulachenko is a former chair for TAPPI International Paper Physics Committee. Together with other co-authors, Prof. Kulachenko contributed with two chapters to the new editions of the book "Mechanics of paper products". Together with co-authors Prof. Kulachenko was awarded with Van den Akker Prize for Paper Physics and Appita Ken Maddern Award.