Multiscale Modelling of Fluid Flow in a Lymph Node

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Abstract:
Lymph nodes are essential components of the immune system, where lymph fluid, containing immune cells and antigens, is processed. Their structure consists of a porous lymphoid compartment and a surrounding thin subcapsular sinus that allows free fluid flow. In this talk, we present a mathematical model, derived using the asymptotic homogenization technique, to capture the multiscale nature of fluid flow within the lymph node. We employ numerical simulations to investigate flow patterns, pressure distributions, and shear stress in detail. These results provide valuable insights into the mechanical environment of the lymph node, advancing our understanding of its role in immune function and offering a foundation for exploring therapies for lymphatic disorders.