Abstract:
Hemodynamics have long been suggested in mediating vascular functions. Image-based computational fluid dynamics (CFD) has emerged as a practical tool for investigating the local hemodynamics in different vascular territories. Integrating the local hemodynamics with vascular responses opens the door to examining flow-induced vascular disease mechanisms and advancing our understanding on vascular functions. This talk will focus on mapping the vascular responses to hemodynamic factors in experimental animal models of aneurysm and atherosclerosis. Specific aspects of the complex hemodynamics at the vascular wall opposing an impinging flow and the observed vascular responses that resemble aneurysm initiation will be presented, and the mapping of disturbed flow to plaques developed in a novel murine model of atherosclerosis will be demonstrated. The integrated information from animal models can translate to humans to better understand vascular disease mechanisms. Finally, some remarks are directed towards the sensitivity of hemodynamic characteristics with respect to variations of the reconstructed geometry and imposed flow conditions in image-based CFD analysis.