

## Recent advances in shape optimization

Shape optimization is a classical topic in mathematics, where several advances have been achieved recently, particularly in novel numerical approaches to problem classes not yet treated so far. Therefore, this talk will discuss the simultaneous optimization of shapes together with the related surface and volume meshes. This leads to a novel linear interpretation of shape optimization delivering new formulations of second shape derivatives and shape-Newton methods. In addition, a Hadamard semiderivative approach will be presented, enabling a straight forward formulation of necessary conditions for shape optimization problems in the context of variational inequalities. Finally, shape optimization in the context of nonlocal models like peridynamics and nonstandard diffusion demands for an appropriate generalization of shape calculus.