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Recent trends in shape and topology optimization

Shape optimization by pursuing diffeomorphisms

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Abstract: We consider PDE constrained shape optimization in the framework of finite element discretization of the underlying boundary value problem. Our approach employs (i) B-spline based representations of the deformation diffeomorphism, and (ii) superconvergent domain integral expressions for the shape gradient. We study the balance of the discretization errors of the finite element method and the B-spline approximation. We provide numerical evidence of the performance of this method on a test case stemming from the class of exterior Bernoulli free boundary problems.