Various Optimization Techniques in Shape Spaces

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ABSTRACT

Shape optimization problems arise frequently in technological processes which are modelled in the form of partial differential equations (PDEs). In many practical circumstances, the shape under investigation is parametrized by finitely many parameters, which on the one hand allows the application of standard optimization approaches, but on the other hand limits the space of reachable shapes unnecessarily. Shape calculus presents a way out of this dilemma. Major effort in shape calculus has been devoted towards expressions in so-called Hadamard-forms, i.e., in forms of integrals over the surface of the shape under investigation. It is often a very tedious process to derive such surface expressions. Along the way, there appear volume formulations in the form of integrals over the entire domain as an intermediate step. In this talk, domain integral formulations of shape derivatives are coupled with optimization strategies on shape spaces. Efficient shape algorithms reducing analytical effort and programming work are presented. In this context, a novel shape space is proposed.