

Advanced density based topology optimization methods

The material distribution method known as topology optimization has experienced an immense increase in attention since the turn of the millennium and the subsequent rise of additive manufacturing techniques. In short, the reason for this is two-fold. Firstly, advances in computational power and numerical methods to solve high-contrast PDEs has allowed the methodology to be applied to real-world engineering problems in reasonable time. Secondly, topology optimization and additive manufacturing forms a near perfect match, in which the design freedom from the material distribution methods complement the geometric freedom provided by 3D printing and vica versa. The talk is focused on state-of-the-art density based topology optimization methods and will cover examples dealing with interactive topology and shape optimization; methods tailored for additive manufacturing; ultra-high resolution structural optimization and projection methods based on numerical homogenization.