Analysis of Linear Elasticity and Self-Weight on Growing Domains in Additive Manufacturing

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We consider a family of linear elasticity equations on growing domains arising in additive manufacturing. By establishing continuity of the corresponding solutions with respect to the height of the domains, we can establish measuarbility of the joint state on the space--height domain. A suitable function space regarding the regularity of this joint solution is introduced./

/We then analyze the self--weight functional measuring constructability through integrated weighted mean compliances. Despite a potentially singular weighting and the lack of compact embeddings of the new function space in L^2, we prove well-posedness and a convergence result, which is used for the existence of minimizers in a corresponding phase-field topology optimization problem.