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OPTIMISATION OF FIBRE-PATHS IN COMPOSITES PRODUCED BY ADDITIVE MANUFACTURING

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Abstract: An innovative research front for composites is their production by additive manufacturing (AM), also referred to as 3D printing. AM, which was previously mainly used for prototyping, is now evolving towards functional components. Part of the motivation in the search for AM developments to fibre composites is to explore the inherent flexibility of the related processes, for example the possibility of laying curved fibre-paths within a component. This work aims to present a variable stiffness curve-based design parametrization to the optimisation of a 3D printed aeronautical lug, made of thermoplastic polymer reinforced by continuous fibres. Results on structural modelling for stiffness and strength show that these quantities behave in different manners for the assumed parametrization. An optimisation problem is proposed, and it is expected that optimised designs for stresses may further enhance the applicability of 3D printed composites in load bearing situations.