Ingenieurfakultät Bau Geo Umwelt

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Titel des Beitrags: A Parameterized Surface Method to Determine Optimal Variable Stiffness Layup Design by Global Search
Abstract: We propose a method related to the level-set method to find optimal steered fibre or variable stiffness (VS) designs for composite laminates. In order to steer the fibres, iso-contour lines of an artificial surface, defined over a 2D geometry domain, are used. The artificial surface is based on a spline approach using a relatively small number of control points. This ensures the smoothness of the artificial surface which can help guarantee continuity/smoothness of the obtained fibre paths. The tangents of the iso-contours of this surface are projected on a structure mesh as fibre angles and the desired structural response is computed; in our case the critical buckling load or a point displacement. To ensure certain manufactural properties of the fibre angle design, the average fibre curvature is constrained. Because of the relatively small number of control points we can use global optimisers; such as evolutionary algorithms, or swarm based options, e.g. Ant Colony optimisation. Results of two example problems show an improved performance with a constraint on average curvature. Future possibilities are discussed. A parameterized

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