

Modeling Laminated Surfaces with Spline Convolution

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Geometric modeling of laminated surfaces built up with composite materials has proved to be a particularly thorny problem. Solid modeling based approaches quickly founder because of the underlying complexity of the models while discrete modeling approaches often fail to adequately capture the effects of the distribution of curvature found in the tooling surface and intermediate ply stack surfaces. One of the most promising approaches identified so far involves taking advantage of the properties of spline-based convolution to build empirical models of the curing process. Although these models fail to capture the underlying physics and chemistry of curing, they often do an excellent job of modeling the shape of the resulting parts, and they honor enough of the physics of the curing process to serve as effective surrogates until more accurate, physics-based models can be developed.