

Connecting the "Dots": Topology Optimization for Fiber-Reinforced Composites

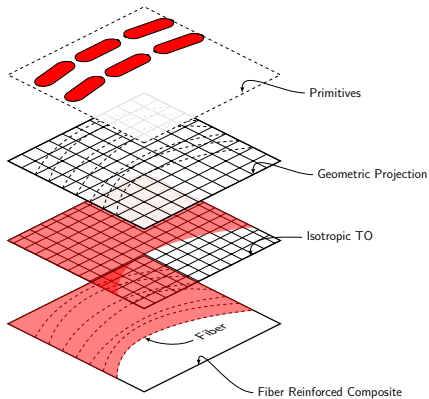
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Simultaneous Fiber & Composite Topology Optimization

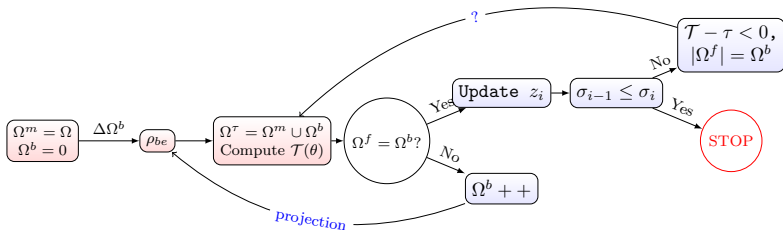


Computing Topological sensitivity field to locate optimal fiber

$$\psi(\Omega) = \frac{1}{2} \int_{\Omega} \sigma(\mathbf{u}) \cdot \varepsilon(\mathbf{u})$$

$$TD(\hat{x}) = \lim_{\epsilon \rightarrow 0} \frac{\psi_{\epsilon}(\Omega) - \psi(\Omega)}{f(\epsilon)}$$

Algorithm



- ① Initilaized $\Omega^m = \Omega$
- ② $\Omega^b ++ \Rightarrow \rho_{be}$; Compute $\mathcal{T}(\theta) \hat{=} \psi$
- ③ Check desired fiber fraction
 - ① $\Omega^b ++ \Rightarrow \rho_{be}$