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

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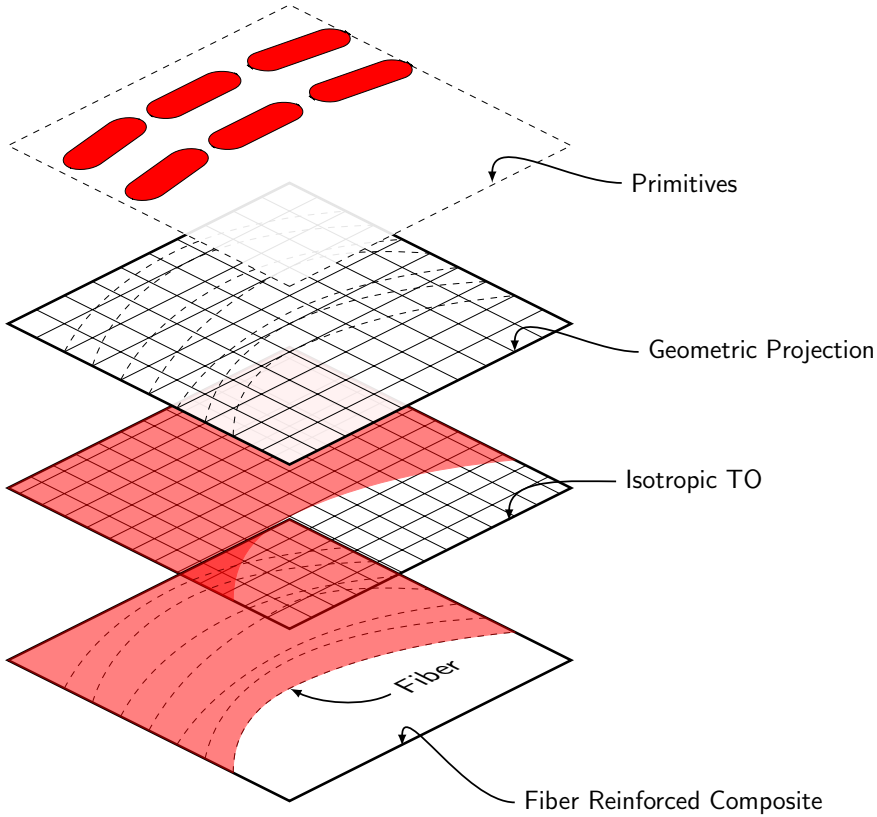
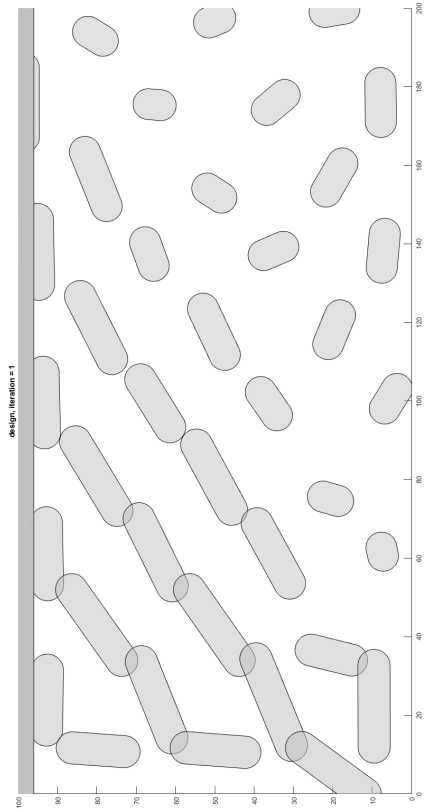
Aim $\Rightarrow$

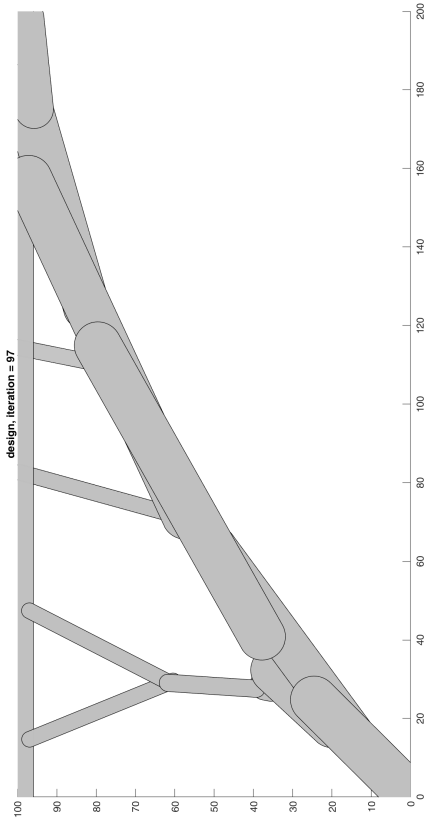
Concurrent free-form (matrix) and geometric primitives (reinforcement) Topology Optimization



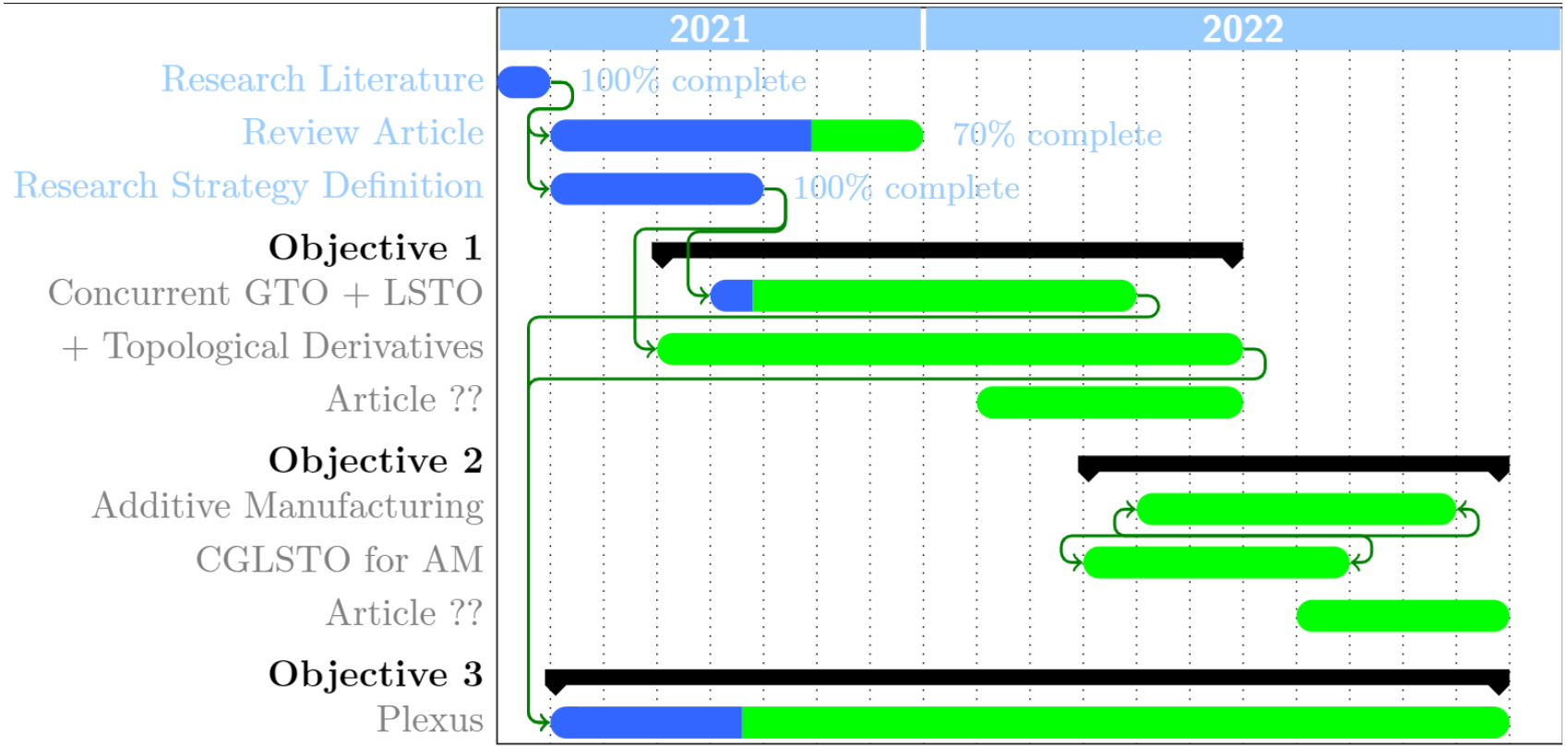
Geometric Projection



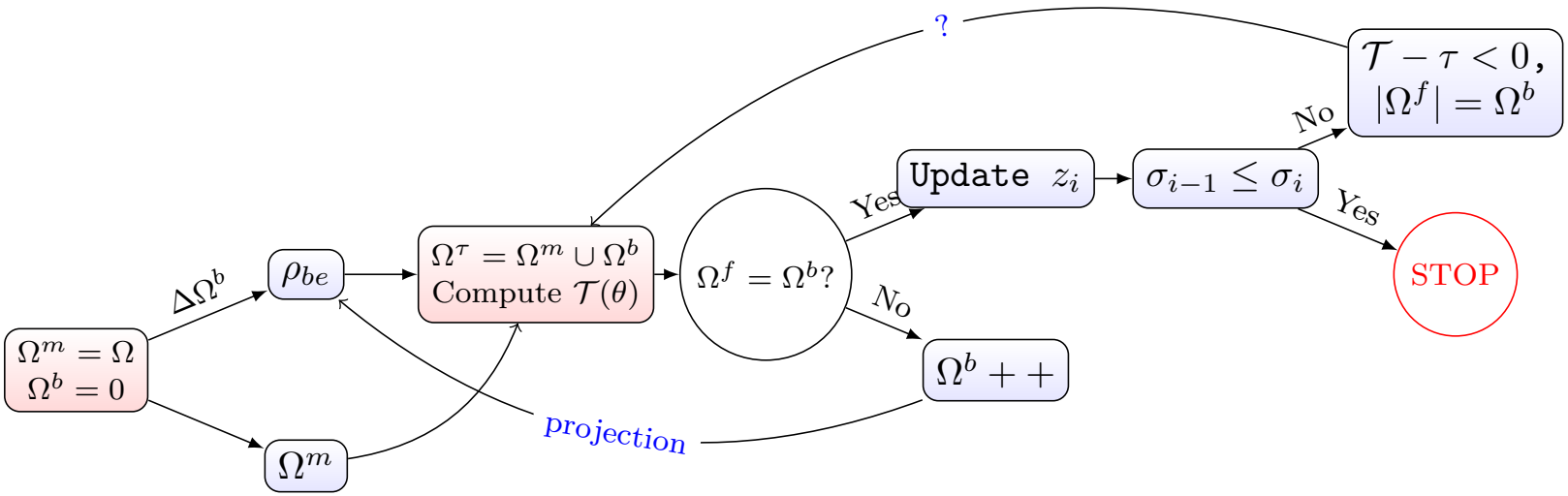
$\cdots \Longrightarrow$



Timeline


2021
2022
Research Literature
100% complete
Review Article
70% complete
Research Strategy Definition
100% complete
Objective 1
Concurrent GTO + LSTO
+ Topological Derivatives
Article ??
Objective 2
Additive Manufacturing
CGLSTO for AM
Article ??
Objective 3
Plexus

Two phases topological derivatives



1. Initilaized $\Omega^m = \Omega$ and ρ_{be}
2. Compute $\mathcal{T}(\theta) \widehat{=} \psi$
   - Generate topological sensitivity field for incorporating fiber inclusions.
   - ρ_{be} considered as single entity
3. Check desired fiber fraction
   - $\Omega^b + + \Rightarrow \rho_{be}$;
   - Check convergence

Activities so far...

What have I studied?

- Analyzed the isotropic PyGTO
- Connective primitives to promote continuous joints

What am I investigating?

- Using the functionality of PyGTO to run SIMP TO
- Using same for level-set methods
- PyGTO code for orthotropic materials