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Research: Optimization of Microstructure
a 3D Printed Heat Exchanger

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Background

- power plants use freshwater for cooling
- availability of freshwater varies geographically, so the location of power plants is dependent on the supply of water
- air-cooled heat exchangers would allow flexibility in the location of power plants
- the goal of this project is to design an air-cooled heat exchanger with comparable performance to a water-cooled heat exchanger

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Motivation

To create a high-performing air-cooled heat exchanger, the microstructure needs to be optimized for maximum heat transfer and minimal pressure drop

Modeling is necessary in order to explore various fin and subfin designs

3D printing allows for the addition of small-scale features that increase heat transfer

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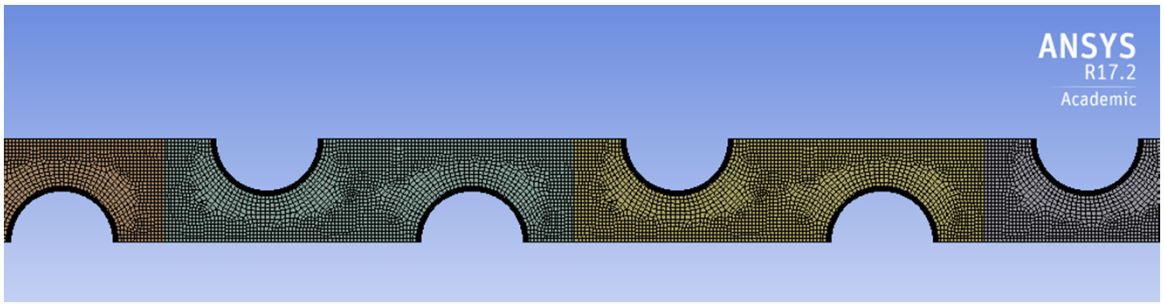
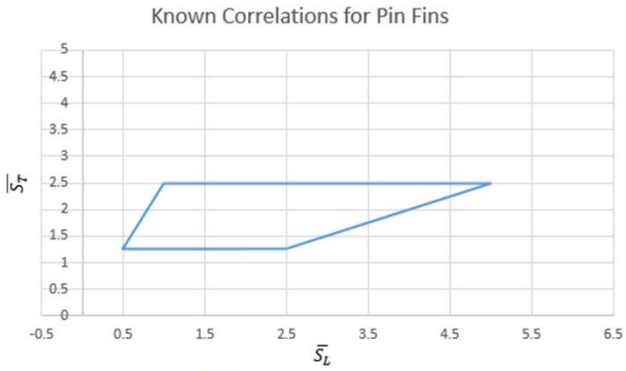
Modeling

Model various geometries for pin subfins and create dimensionless correlations that can be used for optimization

Model unconventional geometries of fins to increase heat transfer and decrease pressure drop

Use CFD simulation to choose optimal design





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