Performance Improvement in Polymeric TIMs:
Hierarchically Nested Channels and Improved Interfacial Adhesion

Faculty: S. V. Garimella, G. Subbarayan **Students: Nikhil Bajaj**

Objective

Develop models and design tools for viscous squeeze flow in Hierarchically Nested Channels (HNCs) to enable topological optimization

Approach

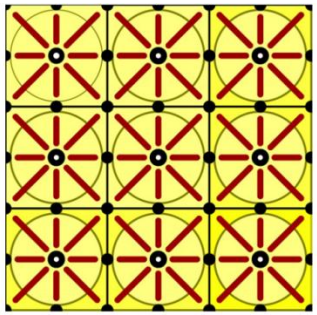
- Experimental setup for Bond Line Thickness (BLT) measurement
- Modeling of squeeze flow problem and thermal resistance networks to predict performance
- Non-linear programming and geometry optimization methods for design

Publications

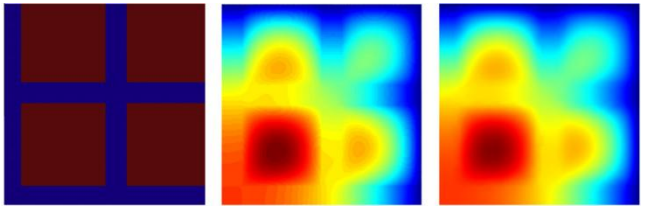
N. Bajaj, G. Subbarayan and S.V. Garimella, "Topological Design of Channels for Squeeze Flow Optimization of Thermal Interface Materials," *International Journal of Heat and Mass Transfer*, Vol. **55**, pp. 3560-3575, 2012.

Resistance Network Modeling

Resistance Network Diagram

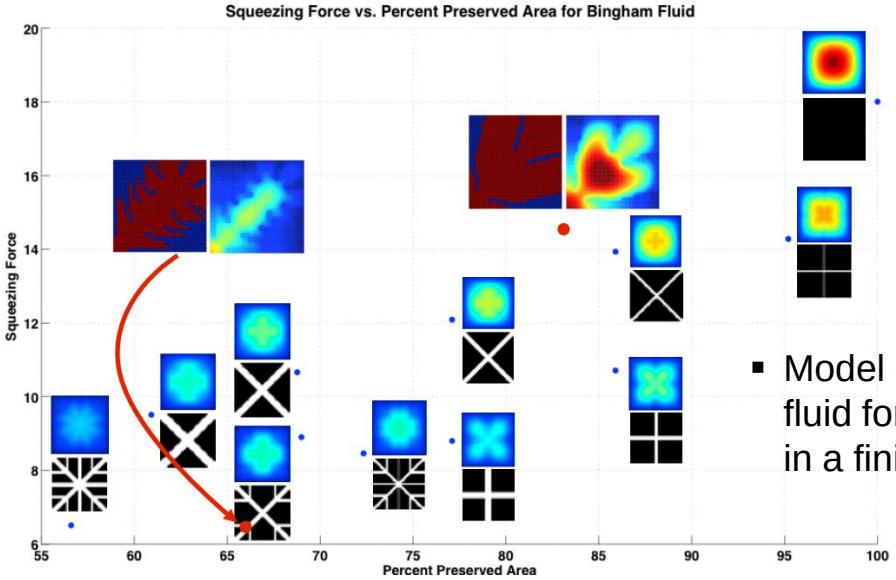


- Design optimization requires solution speed of analytical model to avoid FEM/CFD



Geometry **Resistance Network** **FEM**

Bingham Material Behavior



- Model of a Bingham fluid for TIMs results in a finite BLT