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Research: CFD simulation of PHP (pulsating heat pipes)

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Motivation and Goals

- Build a 3D model of a helium-based pulsating heat pipe
- CFD modeling can reduce the amount of experimental work
- Gain a better understanding of working principle of PHP
- Investigate how different parameters influence php performance
- Using HPC(high performance computer) to run simulations



Modeling

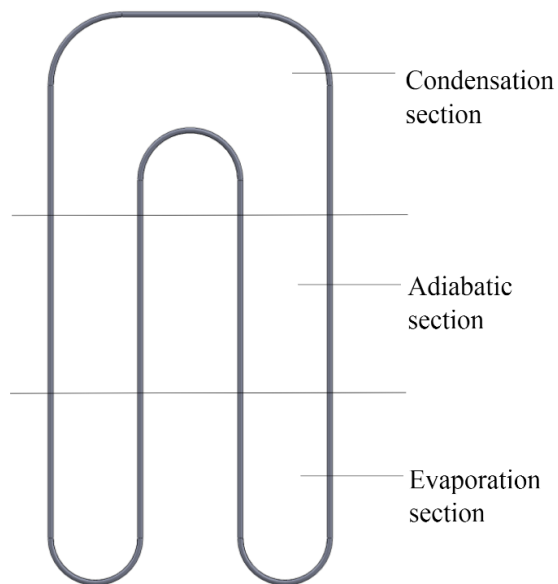


Figure 1. Geometric model.

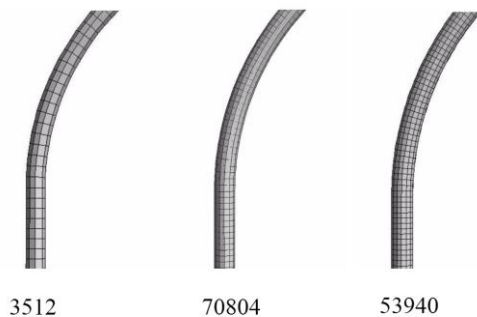


Figure 2. mesh models.

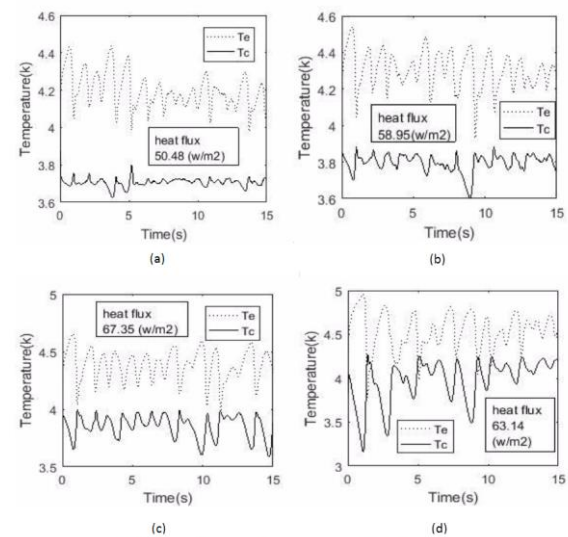


Figure 3. Temperature time series with different heat powers

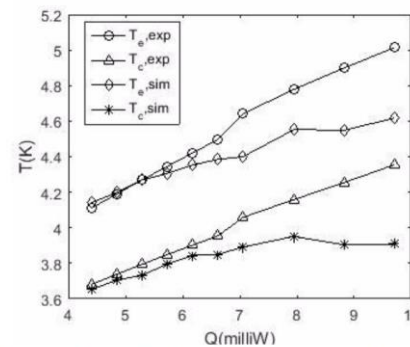


Figure 4. Temperature comparison between simulations and experiments with different heat powers



Conclusion and Future Plan

- Animation of the operating of PHP was obtained
- Temperature oscillations of pulsating heat pipes with helium as the working fluid have been successfully simulated
- Bulk circulation with changing direction was observed
- Larger number of turns will be simulated
- The effects of more parameters(fill ratio,length,etc) will be investigated