

TWO-PHASE HEAT TRANSFER IN RADAR SYSTEMS USING THERMOSYPHON TECHNOLOGY

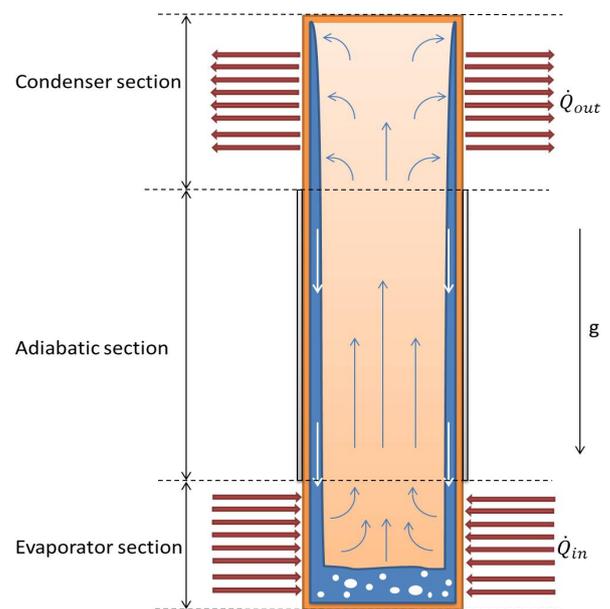
Research Theme: Design engineering for technology integration
Research title: Two-phase heat transfer in radar systems using thermosyphon technology
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Company: Thales Nederland B.V.
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BACKGROUND

Future radar systems are becoming more compact and modular. They however still produce a large amount of heat, which needs to be extracted. Commonly used forced convection cooling approaches are becoming impractical to transfer the generated heat. This thesis describes the implementation of a thermosyphon for the two-phase heat transfer in the antenna front-end of radar systems.

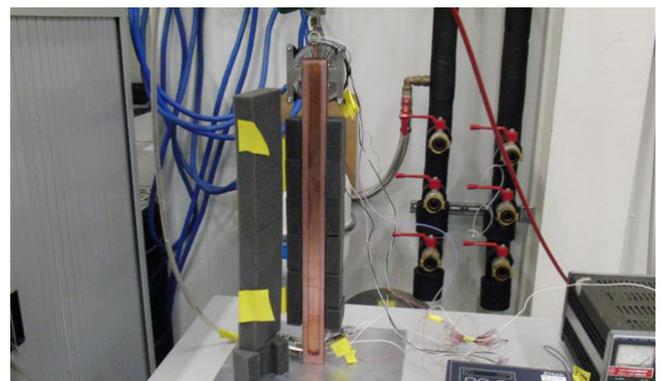
ASSIGNMENT

A literature study was conducted and used for the development of models that predict the performance of a thermosyphon. This thesis presents two models: an analytical model based on Strel'tsov theory and a numerical model based on solving the conservation equations directly. A comparison between the experimental results of the prototype that was built and both models is presented. This comparison showed good agreements and gives valuable insights into the working principle of thermosyphons. The important conclusion is that the effects of the liquid fill ratio and the applied heat flux on the thermosyphon's thermal resistance are difficult to determine analytically or numerically.



RESULTS

The experimental results show that thermosyphons are indeed capable of transferring heat over a relative large distance with a low thermal resistance. The thermosyphon proved to be a promising technology that can be well implemented into the design of a radar system. Finally, a set of future concepts are developed to give an indication of the implementation.



PERSONAL EXPERIENCE

The thesis was both practical and theoretical. I needed to apply a wide range of knowledge from different fields of Mechanical Engineering. Because of the nature of the thesis, I met a lot of people from different departments in the Thales organization. If you want to work in a company that offers a wide range of knowledge in an interesting field of engineering, Thales should be on your list.

