

# Mechanical Engineering Thesis Defense

A Guide to Simplified Thermal Model Construction for Cubesats

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## Abstract

The space industry is rapidly expanding, and components are getting increasingly smaller leading to the prominence of cubesats. Cubesats are satellites sized from coffee mug size to cereal box size. The challenges of shortened timeline and smaller budgets for smaller spacecraft is also their biggest advantage. This benefits educational missions and industry missions alike but can burden teams to be smaller or have more inexperience. Thermal analysis of cubesats is no exception to these burdens which is why this thesis has been written to provide a guide for conducting the thermal analysis of a cubesat using the Deployable Optical Receiver Aperture (DORA) mission as an example. Background on cubesats and their role in the space industry will be examined. The theoretical side of heat transfer necessary for conducting a thermal analysis will be explored. The DORA thermal analysis will then be conducted by constructing a thermal model in Thermal Desktop software from the ground up. Insight to assumptions for model construction to move accurately yet quickly will be detailed. Lastly, this fast and quick method will be compared to a standard finite element mesh model to show quality results can be achieved in significantly less time.



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