

Accepted Manuscript

Research Paper

Modelling of Liquid Nitrogen Spray Cooling in an Electronic Equipment Cabin under Low Pressure

Chao Wang, Yu Song, Peixue Jiang

PII: S1359-4311(17)35566-7

DOI: <https://doi.org/10.1016/j.applthermaleng.2018.02.095>

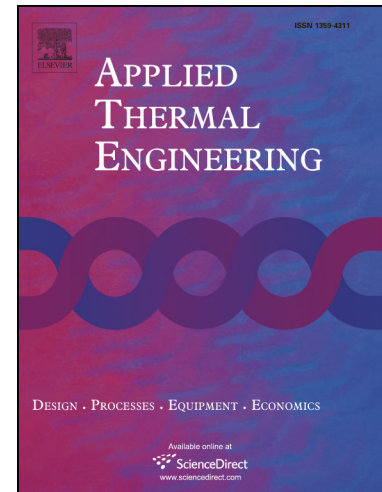
Reference: ATE 11877

To appear in: *Applied Thermal Engineering*

Received Date: 27 August 2017

Revised Date: 28 January 2018

Accepted Date: 27 February 2018



Please cite this article as: C. Wang, Y. Song, P. Jiang, Modelling of Liquid Nitrogen Spray Cooling in an Electronic Equipment Cabin under Low Pressure, *Applied Thermal Engineering* (2018), doi: <https://doi.org/10.1016/j.applthermaleng.2018.02.095>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Modelling of Liquid Nitrogen Spray Cooling in an Electronic Equipment Cabin under Low Pressure

Chao Wang, Yu Song, Peixue Jiang*

Key Laboratory for Thermal Science and Power Engineering of Ministry of Education, Beijing
Key Laboratory for CO₂ Utilization and Reduction Technology, Department of Energy and Power
Engineering, Tsinghua University, Beijing 100084, China

*Corresponding author: jiangpx@mail.tsinghua.edu.cn

Tel.: +86 10 62772661. Fax: +86 10 62770209.

Abstract

Timely and effective cooling is essential for the performance of electronic equipment. For spacecraft, however, the severe aerodynamic heating and low-pressure environment have posed a serious challenge to the heat removal of the high-power electronic equipment. Spray cooling is considered to be an appropriate way to maintain the temperature of the electronic devices within acceptable limits. This paper considers the heat balance in spray cooling using a First Law of Thermodynamics modelling approach as well as a thermal control strategy for a semi-enclosed electronic equipment cabin. Theoretical analysis and numerical results are presented to show the applicability of the developed model and strategy. Characteristics of liquid nitrogen droplet heating, boiling and flash evaporation as well as spray patterns are discussed in detail. Furthermore, the control method of

Download English Version:

<https://daneshyari.com/en/article/7045582>

Download Persian Version:

<https://daneshyari.com/article/7045582>

[Daneshyari.com](https://daneshyari.com)