

Accepted Manuscript

Performance comparison of single- and multi-stage onboard thermoelectric generators and stage number optimization at a large temperature difference

Kunlin Cheng, Jiang Qin, Yuguang Jiang, Silong Zhang, Wen Bao

PII: S1359-4311(18)30404-6
DOI: <https://doi.org/10.1016/j.applthermaleng.2018.05.127>
Reference: ATE 12266

To appear in: *Applied Thermal Engineering*

Received Date: 18 January 2018
Revised Date: 16 May 2018
Accepted Date: 30 May 2018

Please cite this article as: K. Cheng, J. Qin, Y. Jiang, S. Zhang, W. Bao, Performance comparison of single- and multi-stage onboard thermoelectric generators and stage number optimization at a large temperature difference, *Applied Thermal Engineering* (2018), doi: <https://doi.org/10.1016/j.applthermaleng.2018.05.127>

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.



Performance comparison of single- and multi-stage onboard thermoelectric generators and stage number optimization at a large temperature difference

Kunlin Cheng, Jiang Qin^{*}, Yuguang Jiang, Silong Zhang, Wen Bao

Key Laboratory of Aerospace Thermophysics, Ministry of Industry and Information Technology;

Harbin Institute of Technology, Harbin, People's Republic of China, 150001

Abstract

Thermoelectric generator (TEG) is a possible technology of electricity generation for hypersonic vehicles. In this article, a TEG model with variable stage numbers considering the flow and heat transfer process of heat source and cold source, has been developed to compare the performances of single- and multi-stage TEGs at large temperature differences. The thermal resistances of the channel walls and ceramic plate have also been taken into account. The results indicate that the thermal resistance of ceramic plate has a weak influence on the thermoelectric performance. At a constant stage height, the thermoelectric performance with different stage number is strongly influenced by the geometry factor. When the inlet temperature of heat source is at normal (below 800 K), the single-stage thermoelectric generator has a higher maximum power density and corresponding conversion efficiency than the multi-stage TEG with the same total height of thermoelectric module. However, if the inlet temperature of heat source is higher (above 800 K), the multi-stage configuration shows a better thermoelectric performance and the optimal stage number varies with inlet temperature. In a word, the multi-stage TEGs have significant advantages over single-stage TEG at the large temperature differences (over 500 K).

Corresponding author: qinjiang@hit.edu.cn

Keywords: thermoelectric generator; single-stage; multi-stage; electricity generation; hypersonic vehicles; large temperature difference.

Download English Version:

<https://daneshyari.com/en/article/7044953>

Download Persian Version:

<https://daneshyari.com/article/7044953>

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