

Analytical procedure to obtain internal parameters from performance curves of commercial thermoelectric modules

R. Palacios Hielscher; A. Arenas Alonso; R. Rodríguez Pecharromán; F.L. Pagola y de las Heras

Abstract-

Manufacturers of commercial thermoelectric modules provide datasheets of the modules including information and graphs about the performance attained at several working conditions. Details about internal parameters are not made available to customers, because in the broad majority of the cases they are not necessary. However, when developing non-standard applications or conducting research projects it is sometimes necessary to make the modules work in different conditions than those shown in the performance curves. This paper shows a methodology to extract thermoelectric internal parameters from the information provided by performance curves, hence allowing scientists to predict the performance of the module at any working condition. The method is based on the basic equations that link thermal and electrical dynamics in which some parameters must be estimated. As a result it is possible to predict the behavior of the modules if they are operated in a non-standard way. One good example is to simulate how a module designed for cooling applications will behave if used as a Seebeck module for power generation. The proposed methodology has been successfully applied to a commercial Peltier module for which the behavior as a thermoelectric generator was simulated and then tested experimentally, attaining very similar results.

Index Terms- Thermoelectricity; Internal parameter estimation; Performance simulation; Basic equations

Due to copyright restriction we cannot distribute this content on the web. However, clicking on the next link, authors will be able to distribute to you the full version of the paper:

[Request full paper to the authors](#)

If your institution has an electronic subscription to Applied Thermal Engineering, you can download the paper from the journal website:

[Access to the Journal website](#)

Citation:

Palacios, R.; Arenas, A.; Pecharromán, R.R.; Pagola, F.L. "Analytical procedure to obtain internal parameters from performance curves of commercial thermoelectric

modules", Applied Thermal Engineering, vol.29, no.17-18, pp.3501-3505, December, 2009.