

Title: Optimization of the Performance of Fuel Cell Stacks Using an Ultrasonic Humidifier.

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Abstract: This work is concerned with the optimization of the performance of PEM hydrogen fuel cell stacks, a technology that opens up new possibilities for clean energy storage and restoration. We have hand-built a PEMFC open-cathode stack of 20 cells and measured its basic characteristics such as the j-V and j-P curves as well as the dependency of the temperature of the stack on power produced by the stack for constant power of the cooling fans. We have implemented and tested the performance of a new method for water and thermal management – the humidification of air via the use of an ultrasonic water fog generator. Several tests – measuring cooling efficiency, voltage variations between different cells, and j-V and j-P curves – were performed under different temperatures and with or without humidification.

Keywords: fuel cell, self humidification, open cathode, performance