

ABSTRACT NO.: 519

TITLE: **Modelling of Proton Exchange Membrane Fuel Cell (PEMFC) using Matlab**

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Fuel cell power generation systems provide a clean alternative to the conventional fossil fuel based systems. Fuel cell systems have high efficiency and use easily available hydrocarbons like methane. Moreover, since the by-product is water, they have a very low environmental impact. Fuel cell simulators can provide a convenient and economic alternative for testing electrical subsystems such as converters and inverters. The aim of this project is to introduce a novel modeling method for the Proton Exchange Membrane Fuel Cell (PEMFC) based on the novel concept of "virtual prototyping" and to present a simple and accurate model of the cell performance by using the high-level technical computing language Matlab and Simulink. The suggested model describes the steady state behaviour of a PEM fuel cell using its characteristic equations. Electrochemical parameters such as resistivity of the membrane and current density are considered in this modeling method. These parameters are adjustable and present a good solution to predict output voltage, current, efficiency, cell temperature, power loss and output power of the PEMFC. Several results were obtained showing the variation in output of the Simulink model as the input parameters were manipulated. This is followed by a detailed analysis of the model and comparison with a practical fuel cell.