

# Three-Dimensional CFD Modelling and Simulation of a PEM Fuel Cells

Michal Miloslav Uličný<sup>1, a)</sup> and Vladimír Kutis<sup>1, b)</sup>

<sup>1</sup>*Department of Applied Mechanics and Mechatronics, Institute of Automotive Mechatronics, Faculty of Electrical Engineering and Information Technology, Slovak University of Technology in Bratislava. Ilkovičova 3, Bratislava, Slovak Republic.*

<sup>a)</sup> *Corresponding author: [michal.ulichny@stuba.sk](mailto:michal.ulichny@stuba.sk)*

<sup>b)</sup> *[vladimir.kutis@stuba.sk](mailto:vladimir.kutis@stuba.sk)*

**Abstract.** PEM fuel cells produce electric energy by combining atoms of hydrogen and oxygen. Their most promising usage is to power vehicles as an environmentally friendly source of energy. This work is focused on creating and simulating models of standard design PEM fuel cells with straight channels, one with additional cooling channels and one without. Part of the work is focused on discretizing the models in the environment of ANSYS ICEM CFD. Simulations were performed in the environment of ANSYS Fluent. Simulation results for these models are evaluated for different electrical loads in the form of electrical voltage also with visualized field distribution of physical quantities as well as visualized polarization curves.