

## Nonlinear Modeling of the PEMFC Based on NNARX Approach

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**Abstract :** Polymer Electrolyte Membrane Fuel Cell (PEMFC) is such a time-vary nonlinear dynamic system. The traditional linear modeling approach is hard to estimate structure correctly of PEMFC system. From this reason, this paper presents a nonlinear modeling of the PEMFC using Neural Network Auto-regressive model with exogenous inputs (NNARX) approach. The multilayer perception (MLP) network is applied to evaluate the structure of the NNARX model of PEMFC. The validity and accuracy of NNARX model are tested by one step ahead relating output voltage to input current from measured experimental of PEMFC. The results show that the obtained nonlinear NNARX model can efficiently approximate the dynamic mode of the PEMFC and model output and system measured output consistently.

**Keywords :** PEMFC, neural network, nonlinear modeling, NNARX

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