

[< Back to results](#) | 1 of 1[Download](#) [Print](#) [Save to PDF](#) [Save to list](#) [Create bibliography](#)

Journal of Advanced Research in Fluid Mechanics and Thermal Sciences • Open Access • Volume 92, Issue 2, Pages 171 - 181 • 2022

Document type

Article • Hybrid Gold Open Access

Source type

Journal

ISSN

22897879

DOI

10.37934/arfmts.92.2.171181

[View more](#)

Model Predictive Control for Regulating Fuel Cell Stack Temperature and Air Flow Rate

[Abdullah, Muhammad](#); [Idres, Moumen](#) ; [Azan, Mohd](#)[Save all to author list](#)

^a Department of Mechanical Engineering, International Islamic University Malaysia, Jalan Gombak, Kuala Lumpur, 53100, Malaysia

1 31th percentile
Citation in Scopus0.13
FWCI [View all metrics](#) [Full text options](#) [Export](#) [Abstract](#)[Author keywords](#)[Sustainable Development Goals](#)[SciVal Topics](#)[Metrics](#)

Abstract

Stack temperature and airflow rate are vital control problems for Proton Exchange Membrane fuel cell (PEMFC). Two separate Model Predictive Controllers (MPC) have been employed to regulate these problems. The controllers utilized Laguerre and exponential weight functions to reduce its numerical instability and computational time. The temperature MPC considered delayed and constrained coolant pump voltage as manipulated input and stack temperature as the desired output. While airflow MPC manipulated compressor motor voltage to maintain the desired level of oxygen excess ratio subjected

Cited by 1 document

Performance Comparison Between Centralized and Hierarchical Predictive Functional Control for Adaptive Cruise Control Application

Abdullah, M. , Zainuddin, M.A.S. , Ahmad, S. (2023) *International Journal of Automotive and Mechanical Engineering*

[View details of this citation](#)

Inform me when this document is cited in Scopus:

[Set citation alert >](#)

Related documents

Feedback linearization-based MIMO model predictive control with defined pseudo-reference for hydrogen regulation of automotive fuel cells

Quan, S. , Wang, Y.-X. , Xiao, X. (2021) *Applied Energy* [View PDF](#)

Constrained model predictive control of proton exchange membrane fuel cell

Abdullah, M. , Idres, M. (2014) *Journal of Mechanical Science and Technology*

Anti-disturbance control of oxygen feeding for vehicular fuel cell driven by feedback linearization model predictive control-based cascade scheme

Chen, J. , Li, J. , Xu, Z. (2020) *International Journal of Hydrogen Energy*

[View all related documents based on references](#)

Find more related documents in Scopus based on:

- 4 AbouOmar, M.S., Zhang, H.-J., Su, Y.-X.
Fractional order fuzzy PID control of automotive PEM fuel cell air feed system using neural network optimization algorithm

(2019) *Energies*, 12 (8), art. no. 1435. Cited 49 times.
<https://www.mdpi.com/1996-1073/12/8>
doi: 10.3390/en12081435

View at Publisher
-
- 5 Bordons, C., Arce, A., Del Real, A.J.
Constrained predictive control strategies for PEM fuel cells

(2006) *Proceedings of the American Control Conference*, 2006, art. no. 1656595, pp. 2486-2491. Cited 70 times.
ISBN: 1424402107; 978-142440210-6
-
- 6 Ziogou, C., Voutetakis, S., Georgiadis, M.C., Papadopoulou, S.
Model predictive control (MPC) strategies for PEM fuel cell systems – A comparative experimental demonstration

(2018) *Chemical Engineering Research and Design*, 131, pp. 656-670. Cited 62 times.
http://www.elsevier.com/wps/find/journaldescription.cws_home/713871/description#description
doi: 10.1016/j.chemd.2018.01.024

View at Publisher
-
- 7 Abdullah, M., Idres, M.
Fuel cell starvation control using model predictive technique with Laguerre and exponential weight functions

(2014) *Journal of Mechanical Science and Technology*, 28 (5), pp. 1995-2002. Cited 22 times.
doi: 10.1007/s12206-014-0348-3

View at Publisher
-
- 8 Sun, L., Shen, J., Hua, Q., Lee, K.Y.
Data-driven oxygen excess ratio control for proton exchange membrane fuel cell

(2018) *Applied Energy*, 231, pp. 866-875. Cited 204 times.
<http://www.elsevier.com/inca/publications/store/4/0/5/8/9/1/index.htm>
doi: 10.1016/j.apenergy.2018.09.036

View at Publisher
-

View PDF

- 14 Vahidi, A., Stefanopoulou, A., Peng, H.
Model predictive control for starvation prevention in a hybrid fuel cell system

(2004) *Proceedings of the American Control Conference*, 1, pp. 834-839. Cited 126 times.
ISBN: 0780383354
doi: 10.1109/ACC.2004.182352

View at Publisher
-

- 15 Wang, Liuping
(2009) *Model predictive control system design and implementation using MATLAB®*. Cited 1789 times.
[15] Springer Science & Business Media
-

- 16 Abdullah, M., Idres, M.
Constrained model predictive control of proton exchange membrane fuel cell

(2014) *Journal of Mechanical Science and Technology*, 28 (9), pp. 3855-3862. Cited 26 times.
<http://www.springerlink.com/content/1738-494X>
doi: 10.1007/s12206-014-0849-0


View at Publisher
-

- 17 Pukrushpan, J.T., Stefanopoulou, A.G., Peng, H.
Control of Fuel Cell Breathing

(2004) *IEEE Control Systems*, 24 (2), pp. 30-46. Cited 520 times.
doi: 10.1109/MCS.2004.1275430

View at Publisher

View PDF

 Idres, M.; Department of Mechanical Engineering, International Islamic University Malaysia, Jalan Gombak, Kuala Lumpur, Malaysia; email:midres@iiium.edu.my
© Copyright 2023 Elsevier B.V., All rights reserved.