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Name	Kui Jiao	
Affiliation	Tianjin University	
<h2>Invited Keynote Lecture</h2>		
Presentation Title	Toward engineering application: powerful and efficient tool for PEM fuel cell 3D simulation	
Abstract (Approximately 200 words)	<p>Modeling and simulation help shed light on unclear transport mechanism in PEM fuel cell and provide valuable instructions for engineering application. 3D model has advantage on reproducing cell geometry and giving a holistic view of cell operating state. However, it also faces rigorous challenge on simulation efficiency and stability. Here, we first present some simulation work accomplished by 3D model in limited computational domain. Then, a "3D+1D" modeling method will be introduced aiming for efficient large-scale simulation, which has become a burgeoning need of the industry. After comparing the two models, it is found that the "3D+1D" model achieves a decent trade-off between efficiency and accuracy. To further improve the model's adaptability, water transition mechanism among different water state (vapor, liquid and dissolved) in catalyst layer is investigated in detail. A self-adaptive mechanism is proposed based on an application practice in cooperation with a commercial-level laboratory. The "3D+1D" model is comprehensively validated with experimental data regarding cell performance, ohmic resistance, current density distribution and temperature distribution under different operating conditions. It is expected to fulfil the engineering requirement on large-scale simulation regarding commercial-level single cell or even a small stack, as a powerful and efficient tool.</p>	
Biographical Sketch (Approximately 200 words)	<p>Kui Jiao is a professor in the State Key Laboratory of Engines at the Tianjin University, China. He received his Ph.D. degree of mechanical engineering in 2011 from the University of Waterloo, Canada. His research interest includes fuel cell, battery, thermoelectric generator, turbocharger compressor, etc. He has published several books and 200+ papers in international journals such as Nature, and led 30+ national and industrial projects, provided modeling and design services in development of fuel cell engines for many major automotive fuel cell manufactures such as FAW, SAIC Motor, Bosch and Weichai Power. He served as the Chair for several international conferences such as International Conference on Energy and AI, and the founding Editor of Energy and AI and Associate Editor of International Journal of Green Energy. He is the Vice President of the Fuel Cell Engine Division, Chinese Society of Internal Combustion Engine (CSICE), a Fellow of the Royal Society of Chemistry (FRSC), and a Fellow of the Institution of Engineering and Technology (FIET).</p>	