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# 2021 International Green Energy Conference

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Name	Qing Du	
Affiliation	Tianjin University	
<h2>Invited Plenary Lecture</h2>		
Presentation Title	<b>Development of multi-scale and multi-physics simulation models for proton exchange membrane fuel cell systems</b>	
Abstract (Approximately 200 words)	<p>Cost, performance and durability are the main technical challenges before the large-scale commercialization of proton exchange membrane fuel cell (PEMFC). For the aspect of performance and durability, water, heat, and energy management are commonly considered as important factors. The management becomes even more complicated when it comes to PEMFC systems since various auxiliary subsystems need to be monitored simultaneously. Therefore, it is of great importance to comprehensively understand the interaction inside the complicated energy system. To investigate the coupled heat and mass transfer processes, a comprehensive dynamic system model is developed, including a stack sub-model and various auxiliary sub-models such as membrane humidifier, hydrogen pump, air compressor, and radiator. All sub-models have been rigorously validated against experimental data to guarantee the system model reliability. The mutual effects among stack and associated subsystems are investigated, focusing on the overall water utilization and thermal management. To further study transient responses and corresponding energy management for hybrid power systems, electrochemical thermally coupled Li-ion battery sub-model, DC/DC converter sub-model, and vehicle dynamics sub-model are integrated with the system model. Rule-based energy management strategies under China standard operating conditions for light vehicles are studied.</p>	
Biographical Sketch (Approximately 200 words)	<p>Dr. Qing Du is now a professor, as well as the leader of Electrochemical Thermophysics Laboratory of State Key Laboratory of Engines, Tianjin University (SKLE). He obtained his B.S, MS and Ph.D. degree from Tianjin University in 1990, 1993 and 1999 respectively. Beginning in 2000, he carried out a 2-year post-doctoral study, then joined SKLE as an associate professor in 2002 and became a full professor in 2006. His research interests mainly focuses on fuel cells and engines, especially the simulation and experiments of water and heat management of fuel cells, liquid fuel breakup and combustion process of IC engines. He has published over 90 peer-reviewed journal papers and obtained about 15 patents and software copyrights. He now also act as the director of HR Department of Tianjin University.</p>	