Ammonia Combustion: Opportunities and Challenges

Elbaz, Ayman
Clean Combustion Research Center : Professor, Senior Research Scientist

https://doi.org/10.5109/7157927

出版情報：Proceedings of International Exchange and Innovation Conference on Engineering & Sciences (IEICES). 9, pp.16-17, 2023-10-19. 九州大学大学院総合理工学府
バージョン：

Keynote Speaker

Name: Ayman Elbaz
Professor, Senior Research Scientist, Clean Combustion Research Center, KAUST, Thuwal, Saudi Arabia
Email: ayman.elhagrasy@kaust.edu.sa

Short Biography

Dr. Elbaz serves as a senior research scientist at the Clean Combustion Research Center (CCRC) in KAUST, Saudi Arabia. He earned his PhD in mechanical power engineering from Helwan University, Cairo, in 2008. With a Fulbright visiting assistance professor grant, he conducted research at the Faculty of Engineering, Vanderbilt University, USA, from 2009 to 2010. During this period, he focused on advancing the N_2O molecular tagging velocimetry technique for supersonic flow measurements. Subsequently, Helwan University appointed him as an assistant professor from 2011 to 2012. Dr. Elbaz then joined CCRC, KAUST in 2012 as a post-doctoral researcher. In 2013, he assumed the role of a research scientist at KAUST and has recently been promoted to the position of senior research scientist.

Ammonia Combustion: Opportunities and Challenges

Abstract

The decarbonization of the energy sector is a multifaceted process, involving diverse strategies for a gradual transition toward a low-carbon mobility future. Ammonia, positioned as an alternative fuel, plays a crucial role in this shift due to its attributes as an energy carrier—a carbon-free molecule with substantial energy density—and the existing, well-established infrastructure for its production and distribution. While conventional ammonia production methods persist, the emergence of green ammonia underscores the need for further advancements to integrate ammonia into the global low-carbon energy landscape. Despite its potential, the low reactivity of ammonia poses challenges in its utilization for power generation. To enhance ammonia's reactivity, one viable approach involves adopting a dual-fuel system by incorporating combustion promoters. Consequently, the combustion characteristics of ammonia were explored through blending it with varying proportions of dimethyl ether (DME). The laminar burning velocity of these NH3/DME blends was investigated using a constant volume spherical reactor (CVSR). DME, a reactive fuel generated within a sustainable carbon cycle, achieves net zero-carbon emissions. In my presentation, I will delve into the specifics of the laminar flame speed of NH_3/DME blends.