

PSGEC2023 (Shanghai) 3rd Power System and Green Energy Conference August 24-26, 2023

Keynote Lecture

Title:

Survey of 99.9% Class Efficiency DC-AC Power Conversion and Its Future Applications

Speaker:

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Abstract:

With the advent of wide bandgap semiconductor devices, power conversion with high conversion efficiency has become possible. The DC-AC power conversion (inverter) is more difficult to achieve ultra-high efficiency than DC-DC conversion because the output is ac, and the input-output voltage ratio changes.

First, a survey of recent published literature on inverters with efficiencies in the 99.9% class is presented. Next, the speaker presents the latest results of a 99.9%-class HEECS inverter being pursued by the speakers' group. With higher efficiency comes the need to guarantee the accuracy of the measurements. The speaker proposed a loss measurement method called the VTASLM method, which uses only electrical measuring instruments, and measured a conversion efficiency of 99.75% with a measurement accuracy of 0.006%. In addition, the measured results of the loss breakdown are presented, a methodology on how to obtain higher efficiency is presented, and the latest highest efficiency data (SiC and GaN HEECS inverters) will be presented. Finally, future applications using high efficiency power converters and the speaker's dreams will be introduced.

(171 words)