

Abstract Submitted
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Simulation and Experimental Study on the Efficiency of Traveling Wave Direct Energy Conversion for Application to Aneutronic Fusion Reactions¹ ALFONSO TARDITI, Electric Power Research Institute, ANDREW CHAP, University of Maryland, College Park, MD, GEORGE MILEY, University of Illinois-Urbana-Champaign, Urbana, IL, JOHN SCOTT, NASA Johnson Space Center — A study based on both Particle-in-cell (PIC) simulation and experiments is being developed to study the physics of the Traveling Wave Direct Energy Converter (TWDEC, [1]) with the perspective of application to aneutronic fusion reaction products and space propulsion [2]. The PIC model is investigating in detail the key TWDEC physics process by simulating the time-dependent transfer of energy from the ion beam to an electric load connected to ring-type electrodes in cylindrical symmetry. An experimental effort is in progress on a TWDEC test article at NASA, Johnson Space Center with the purpose of studying the conditions for improving the efficiency of the direct energy conversion process. Using a scaled-down ion energy source, the experiment is primarily focused on the effect of the (bunched) beam density on the efficiency and on the optimization of the electrode design. The simulation model is guiding the development of the experimental configuration and will provide details of the beam dynamics for direct comparison with experimental diagnostics.

[1] H. Momota et al., *Fus. Tech.*, 35, 60 (1999)

[2] A. Chap et al., *Proc. 49th AIAA Joint Propulsion Conference (JPC)*, San Jose, CA (2013)

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