Abstract Submitted
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Microwave Plasma Discharge Combustor[1] JONATHAN DICLEMENTE, KEITH CARTWRIGHT, ANDREW CHRISTLIEB, TONGHUN LEE, STEVE HAMMACK, AFRL TEAM, MICHIGAN STATE UNIVERSITY TEAM — This work describes a numerical simulation of an experimental microwave plasma enhanced combustion system. The microwave torch is a co-axial structure where the inner electrode acts as an antenna to transport 2.45 GHz microwaves to the tip of the torch where energy from the plasma is coupled into the flame. The internal dimensions of the torch are adjusted so that an electromagnetic standing wave can be generated. A 2-D electromagnetic, particle-in-cell fluid hybrid simulation of the co-axial structure shows the electromagnetic power flow through the torch. The simulations show a standing wave coupled through the co-axial structure and along the plasma flame. The following profiles are provided: electric field, power flow, energy deposition, plasma density, and excited species. Furthermore, the plasma dielectric constant, which depends on the density and collision frequency, controls the spatial distribution of the standing wave.

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