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Gasification and Ionization of Chemically Complex Liquids for FRC Injection MICHAEL HOLMES, Air Force Research Laboratory, CARRIE HILL, ERC, Inc. — Ion thrusters provide reliable and efficient spacecraft propulsion but are limited to noble gas propellants to limit chemical attack of components. However, thrusters based on Field Reversed Configuration (FRC) plasmas are becoming a reality. High beta compact-toroids are generated within an FRC thruster and then expelled to provide thrust. The closed field lines restrict the plasma from attacking thruster components. More convenient propellants such as water are therefore possible. The FRC thruster would generate a series of compact-toroids (plasmoids) to develop continuous spacecraft thrust. Each plasmoid ejection would empty the discharge region. The feed system would then refill the discharge region with partially ionized gas for the next discharge. The ionization part of this feed system is the subject of this paper. The question is how to produce a uniform, chemically complex, ionized gas within the discharge region that optimizes compact-toroid formation? We will be measuring chemical state, ionization state, and uniformity as the propellant enters the discharge region.

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