GAS PUFFING FOR THE FRCHX EXPERIMENT*

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In the Field-Reversed Configuration Heating Experiment (FRCHX) at the Air Force Research Laboratory (AFRL) a field-reversed configuration (FRC) magnetized plasma is formed by several theta discharges. These FRCs must have lifetimes of at least 20 μs, to allow time for translation and subsequent compression. They must also have little or no rotation, in order to be usefully compressed to high energy density conditions.

One approach which we are implementing to reduce, eliminate, or reverse rotation is capacitor charged bias rings [1,2,3] downstream of the compression – magnetic mirror trapping region. This requires that we replace the standard gas prefill used in such FRC formation – translation – trapping with a gas puff system. This system must put approximately 25 to 75 milliTorr of deuterium in the formation region, approximately 30 to 80 cm downstream of the puff valve, and to result in sub-milliTorr density approximately 150 cm downstream of the puff valve. We have succeeded in achieving this, using an overdriven Parker Ultra Low Leak Extreme Performance Valve, Series 99. We used fast ion gauges at 6 locations approximately 30 to 150 cm downstream from such a valve to obtain measurements of gas density vs time vs plenum pressure vs valve open – close duration. Our paper will give some detail on this.


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