Characteristics of Biased Electrode Discharges in HSX
HSX Plasma Laboratory, U. of Wisconsin, Madison

1. Structure of the Experiments

2. The Biased Plasma as a Capacitor

Bias Waveforms Indicate a "Capacitance" and an Impedance

3. Two Time Scales Observed in Flow Damping

Simple Fluid Damping Example

Mach Probes in HSX

- Flow vector components are determined from the measured flow direction at a point on the probe surface.
- Flow vector components are determined from the measured flow at a point on the probe surface.

Flow Analysis Method

- Equation for momentum transfer is different from the equation for momentum transfer in the fluid.
- Assumed to be incompressible, the fluid is assumed to be incompressible.

Model Fits Flow Rise Well

- Similar model was used to describe the flow in a hypothetical experiment.
- Assumed to be incompressible, the fluid is assumed to be incompressible.


Solve the Momentum Equations on a Flux Surface

- The momentum equations are solved on a flux surface.
- The momentum equations are solved on a flux surface.

Formulation #1: The External Radial Current is Quickly Turned On.

- Original calculation by Canik, Kendl, and Talmadge
- Flow vector components are determined from the measured flow at a point on the probe surface.

Formulation #2: The Electric Field is Quickly Turned On.

- Assume that the electric field is turned on quickly.
- Flow vector components are determined from the measured flow at a point on the probe surface.

5. Comparisons Between QHS and Mirror Configurations of HSX

- Flow vector components are determined from the measured flow at a point on the probe surface.
- Flow vector components are determined from the measured flow at a point on the probe surface.


Impedance in Smaller in the Mirror Configuration

- Five measurements were taken in the mirror configuration.
- Flow vector components are determined from the measured flow at a point on the probe surface.

V, Fluctuation Reduction with Bias

- Variation of the fluctuation reduction with bias
- Variation of the fluctuation reduction with bias

Distinct Spectral Peaks in the Electrode Current

- Variation of the fluctuation reduction with bias
- Variation of the fluctuation reduction with bias

7. Computational Study: Viscous Damping in Different Configurations of HSX

- Variation of the fluctuation reduction with bias
- Variation of the fluctuation reduction with bias

- Variation of the fluctuation reduction with bias
- Variation of the fluctuation reduction with bias