Complex plasma Vortex:

Velocity Distribution Map
Contents

- Introduction
- Analysis
- Results
- Conclusion

Experimental setup

Initial attempts at visualisation
Introduction

- 15MHz Argon Capacitive Coupled Discharge

Diagram:
- VCR @ 25HZ
- CCD Camera
- Earth Electrode with Dust Tray attached
- Pin Electrode
- 15MHz Signal Generator
- Power Electrode
Top view of Apparatus

- Dust Vortices
- Plasma
- Pin Electrode
- Power Electrode
Data Footages
Analysis of Data

- Applied Tracking program
- Manual Tracing of Blurred Dust

Problems with the “Closest Dust” algorithm

- Frame $n$
- Frame $n + 1$
Results

The Effect of Power on Velocity Distribution in Horizontal Plane

The Effect of Power on z-component of the Velocity of Particle

Vertical cross section of dust vortex

Results

Dependency of the rotation frequency on pressure for horizontal vortices

\[ \omega = \frac{2\pi f v}{2 m g Z_0} \]

\[ \beta = 20 \text{ mm}^3 \]
Visualisation of Velocity Map
Conclusion

- Pressure and Power do affect the characteristics of a vortex
- Require a consistent tracking program
- Visualisation will be a useful tool in further understanding