

2013 Student Launch Initiative Project with Dielectrophoresis

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The Mission

The University Student Launch Initiative project at UAH introduces students to the profile of design, build, fly, and analyze. This year, a team of 15 undergraduate mechanical and aerospace engineering students joined hands in designing and building a rocket to fly to a target altitude, carrying a scientific payload, and safely recovering the data.



The 2012-2013 UAH USLI Team

The Rocket

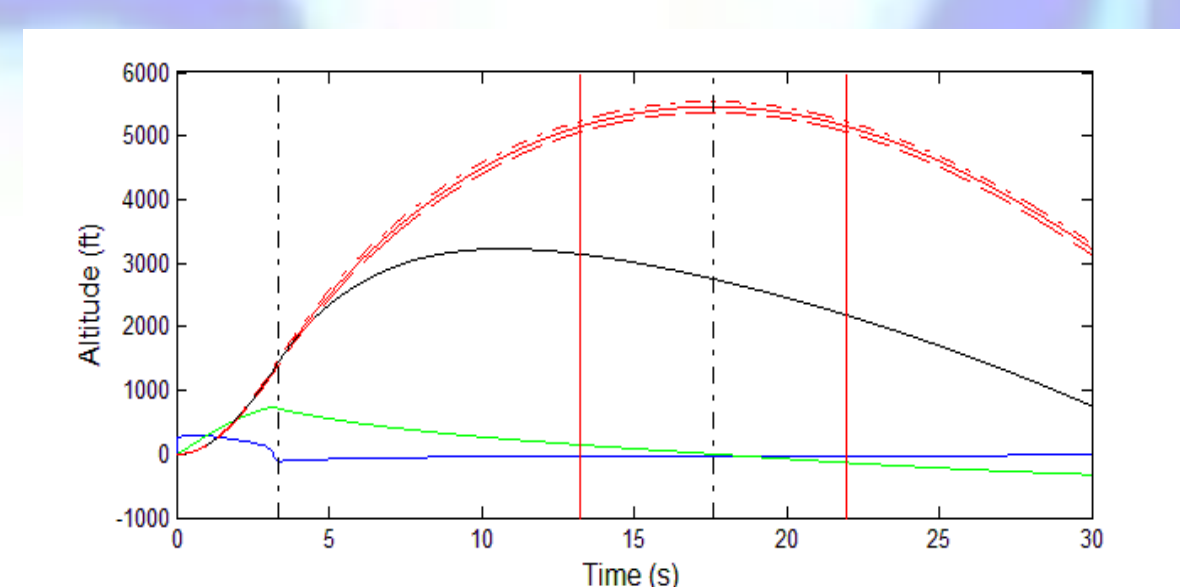
- Boosted Dart – Innovative 2 Stage Design
- Advanced Tracking System with “Visual” Tracking
- Launch Detect System
- Pyrotechnic Dual Event Recovery
- “In-House” Manufacturing
- Commercial Solid Grain Rocket Motor



“Separation Anxiety”

Flight Predictions

- Apogee: 5360 ft
- 2nd Stage Separation Altitude: 2200 ft
- Max. Acceleration: 8.8 g’s
- 4 Seconds of Less Than 0.1g’s



Flight Trajectory Predictions

Results

- Finished 6th Out of 37 University Teams in 2013 NASA SLP competition.
- Reached Out to an Estimated 41,000 People while Being on Rocket 95.1 FM
- AIAA Paper: “The UAH 2013 University Student Launch Initiative Project,” AIAA 2013-4108

Acknowledgements

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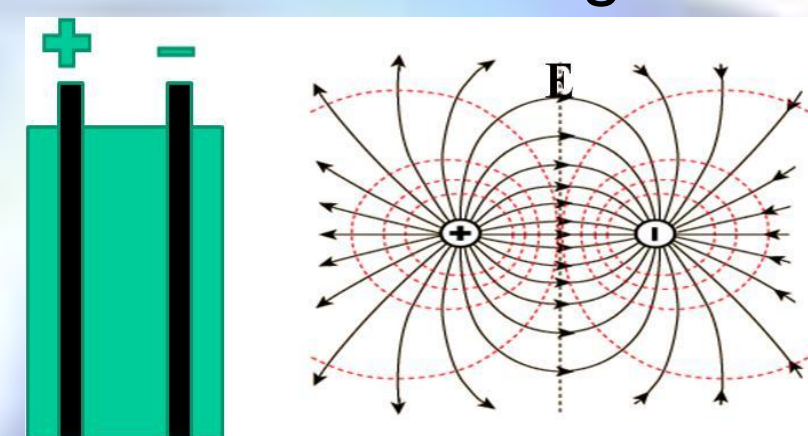
Dielectrophoresis Payload

- Dielectrophoresis: a force induced on an electrically neutral fluid particle in a non-uniform electric field.
- Force acts in the direction of the increasing strength of the electric field.

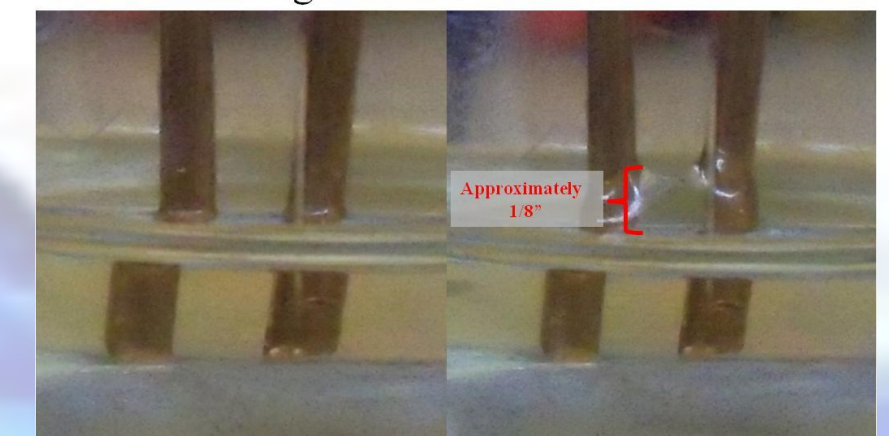
Spaceflight Application

- Dielectrophoretic force used as a propellant management system in cryogenic fuels in microgravity.
- Fluid collection at the center of a tank to reduce heat transfer from the walls of the tank.

Parallel Rod Configuration



No Voltage Voltage Applied



Laboratory Experiment of Dielectrophoresis

Post Flight Review and Impact

- Actual Apogee: 5374ft
- 2.5 Seconds of Less Than 0.1g’s
- Further testing Required for Proof of Concept Experiment
- Undergraduate Team Performing Research for Spaceflight Application
- Project Management and Design/Build Experience to Prepare Students for Industry Work
- STEM Outreach to Inspire Younger Generations to Continue Following Their Dreams



USLI Students with Rocket Camp Students

