

SA AMSAT SPACE SYMPOSIUM

Space - a challenging Amateur Radio frontier

24 May 2014

Innovation Hub, Pretoria

Mark Shuttleworth Street, The Innovation Centre, Pretoria



08:15 Registration

08:45 Official welcome

Dave Long ZS5FR President SA AMSAT

09:00 Key note address

09:30 Influence of Cathode Shape on Vacuum Arc Thruster Performance and Operation

Jonathan Lun PhD Student *SANSA Space Science*

Vacuum arc thrusters are a potentially useful technology for use as microthrusters, given their simplicity, low mass and low power requirements. However, further development is still needed to improve and mature their performance and operation. In an effort to improve thruster characteristics, we investigate the use of conically-shaped convergent cathode surface profiles in a low-power coaxial vacuum arc thruster design. Experimental measurements of ion current density distribution, thrust and erosion rate were taken for a range of cathode profiles and materials. Results show that modifying the profile of the cathode face can affect the plasma jet's plume distribution and even improve thrust production in certain cases. One likely cause of the thrust improvement is speculated to be increased charge exchange collisions resulting in a lower average ion charge state of the ejecting plasma.

10:15 Refreshment break

10:45 The Funcube mission overview and early operation results

Johan Erasmus ISIS - Innovative Solutions In Space, South African Branch

The FUNcube mission was started roughly four years ago as a collaborative effort between Amsat-UK and ISIS. From modest beginnings the project gained momentum as mission requirements were put in place, a design team was established and trade-off studies were done between hardware/software that needed to be developed or bought for the mission. The engineering model and flight model of the satellite were assembled by late 2011 and that led to the project testing phases and the challenge of preparing for launch.

These exciting mission phases are discussed highlighting the mutual benefits of collaboration between an amateur radio group like Amsat-UK and an industry player like ISIS. In conclusion some highlights of the operational phase of the FUNcube 1 mission since its launch on a Dnepr cluster launch from Kosmotras in Yasny Russia on 21 November 2013 is presented as well as some future plans for the mission.

11:30 DYNACUBE – REACHING THE FINAL FRONTIER

Rick Botha, Denel Dynamics

The final frontier for DynaCube is the journey it will take into the vast expanse of space. Reaching that frontier, though, is no easy journey. This journey began, as many of you will know, in early 2012. In that year, a group of Interns from Denel Dynamics laid the foundations for a cubesat that would become known as DynaCube. The interns laid down specifications, did detail designs, and performed many tests during that year.

In 2013, the project was given the status of a fully-funded project which allowed the project team to continue with the work that had been started the year before. Initially it was thought that 8 months was all it would take to complete the second phase of the project, but this was not to be true. A variety of issues such as resource availability, lack of clear requirements, and a lack of continuity meant that the project was greatly impaired.

The project team in 2013/2014 was much smaller than the initial group, and the work was a lot slower, but the outputs delivered were of a high quality. The main focus during the second phase of the project was on updating the structure of the cubesat to allow more space inside, completing the deployment system, testing the antennas and getting them to resonate, completing the PCB stack, specifying quality connectors, writing a proper interface schematic, designing and building new solar panels, completing the ground station, and dealing with various regulatory issues.

The presentation will touch lightly on each of these issues, and will focus mainly on the pitfalls that any cubesat team may encounter, and ways to get around these.

12:15 “How the heck did you find that satellite with no PC nearby?”

Riaan Greeff, ZS4PR

Modern smart phones, tablets and various smart devices are packed with technology. Other than allowing internet access through WIFI and GSM networks, these nifty devices also allows radio amateurs and technology enthusiasts to do so much more.

The demonstration is made on a tablet and a smartphone. Topics and examples of typical tracking and prediction software will be presented including some modes of operation such as Morse code decoding , APRS and telemetry decoding

13:30 Lunch Break

14:15 TshepisoSat—in orbit

Leon Steenkamp CUPT

The paper will give a brief introduction to the satellite and mission. An outline of the milestones reached so far with the Tshepiso nano-satellite will be given, the outstanding activities that must still be completed and challenges faced. Some of the images captured by the satellite will also be presented.

14:45 Isolated USB Transceiver Control with Sound Card Interface

A preview of the SARL Radio Technology in Action 2014 construction project

Frik Wolff ZS6FZ

15:15 KLETSKOUS Presentations

Hannes Coetzee: Progress report and demonstration of the transponder

Fritz Sutherland jnr: Get KLETSkous powered in space

Brian McDonald : Controlling KLETSkous

Deon Coetzee: Building the space frame and antenna deployment

16:30 General Discussion

16:45 SA AMSAT AGM