Samara State Aerospace University

Summer space schools as the effective form of operation above international educational space projects

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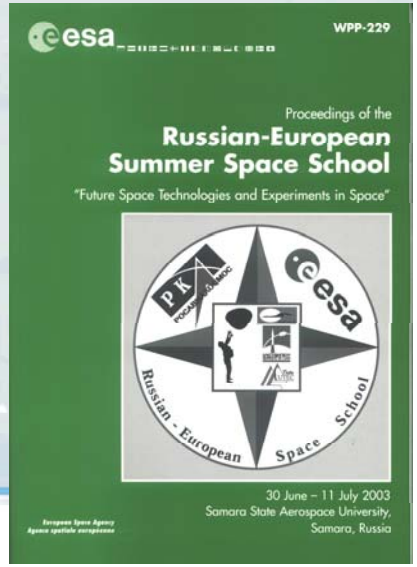
http://www.volgaspace.ru/school/

2003

The First Russian – European summer space school “Future space technologies and experiments in space”

University of Moderna e Reggio Emilia (Reggio Emilia, Italy)
Universita di Roma "La Sapienza" (Roma, Italy)
University of Bologna (Bologna, Italy)
ENSICA (Toulouse, France)
Universidad de Valladolid (Valladolid, Spain)
Universidad Politcnica de Madrid (Madrid, Spain)
UPM Avda (Madrid, Spain)
Crandfield University (Crandfield, Great Britain)
Oulu University (Oulu, Finland)
Moscow State University (Russia)
Moscow State Technical University (Russia)
Scientific-Research Institute Physical Measurements (Russia)
Samara State Aerospace University (Russia)



Contenst of Summer School - 2003

Presentations

1. International cooperation programs of the Samara Space Rocket Centre "TsSKB-Progress"
2. YES2 project to-day: results and future program (Delta-Utec SRC)
3. The Foton/Bion projects at ESA: past, present, and future (ESA/ESTEC)
4. The program of SSAU space experiments
5. The KX project: a satellite-sensor for detecting space debris

Round tables

1. Problems of manned space flights (Presentation by a Russian cosmonaut)
2. Problems of space education and participation of youth in space researches (meeting SSAU administration)

Mini-conference YES2 students: statement and results.
Final mini-conference: (results of work and plans for the future).

Visiting SSAU laboratories

Visit to Space Rocket Centre 'TsSKB-Progress'

Workshops on groups

Contenst of Summer School - 2003

Common lectures

1. Aerospace Samara (Museum of SSAU).
2. Microgravitational space platforms 'Foton-M/Bion-M': performance and possibilities.
3. Organization and implementation of space experiments
4. Russian space program (Russian AeroSpace Agency).
5. Science and engineering of FluidPac (ESA/ESTEC).
6. The Foton-M mission ballistic plan and the role of Ground Control Centre.
7. Influence of disturbing space factors on reliability of spacecraft and experiments in space
8. Unrealized Russian space projects (N-1, the Energy - Buran) as a launching pad to future (Rocket Space Corporation 'Energy').

Special lectures

on subjects of group 1:
Numerical and experimental definition of aerodynamic performances of recoverable capsules
Scattering of recoverable capsule landing points
Safety thermodynamic problems of recoverable capsules.
Influence of mass and aerodynamic asymmetry on a of recoverable capsules rotation
on subjects of group 2:
Tether dynamics at the development stage and the problem of Foton mission safety
Problems of navigation, guidance and control with reference to project YES2
Problems of telemetry, the role of ground control centre and control of YES2 using onboard means
on subjects of group 3. Possibility and problems of YES2 deployment on Foton

2004

The Second Russian – European summer space school “Future space technologies and experiments in space”

Universidad de Valladolid (Valladolid, Spain)
University of Patras (Patras, Greece)
Politecnico di Milano (Italy)
University of Padua (Padova, Italy)
University of Moderna e Reggio Emilia (Reggio Emilia, Italy)
Technische Universitat Dresden (Germany)
University of Kent (United Kingdom)
Lulea University of Technology (Sweden)
Delta-Utec SRC (Leiden, The Netherlands)
Izhevsk Radio Plant (Russia)
Scientific-Research Institute Physical Measurements (Russia)
Samara State Aerospace University (Russia)

Martin Zell, Head of Utilization Department, Directorate of Human Spaceflight
Deter Isakeit, Head of Erasmus User Center and Communication Office
Werner Riesselmann, Head of Microgravity Payloads Division

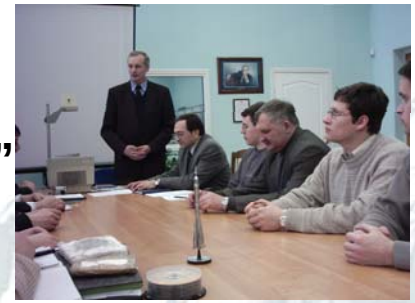
ESA delegation

2004

The Second Russian – European summer space school “Future space technologies and experiments in space”

2004

The Samara Center of Expertise
International Project YES2
"Second Young Engineering Satellite"



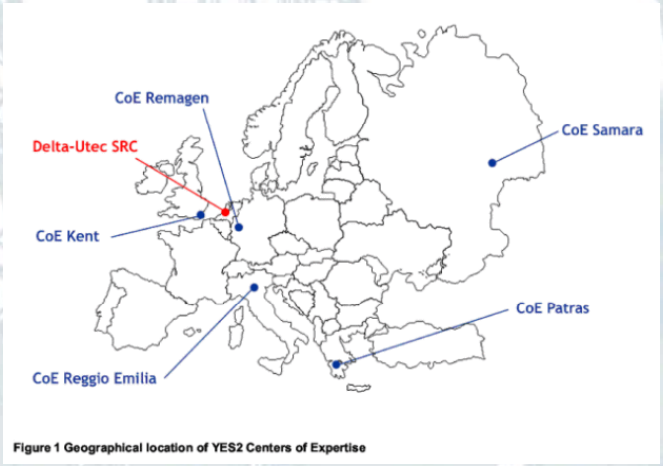
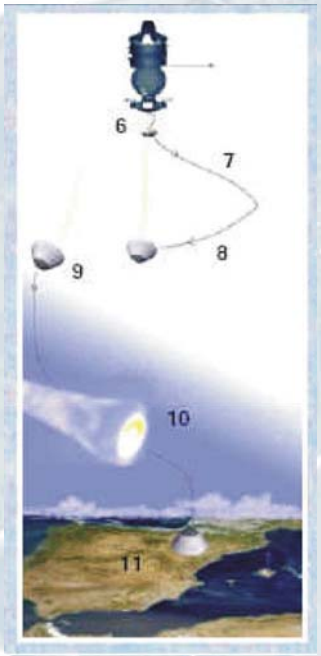
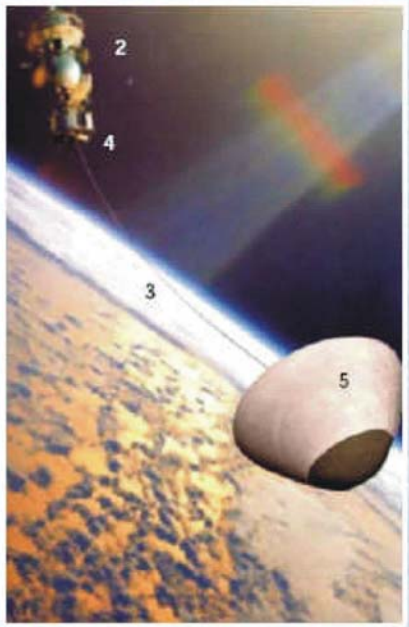


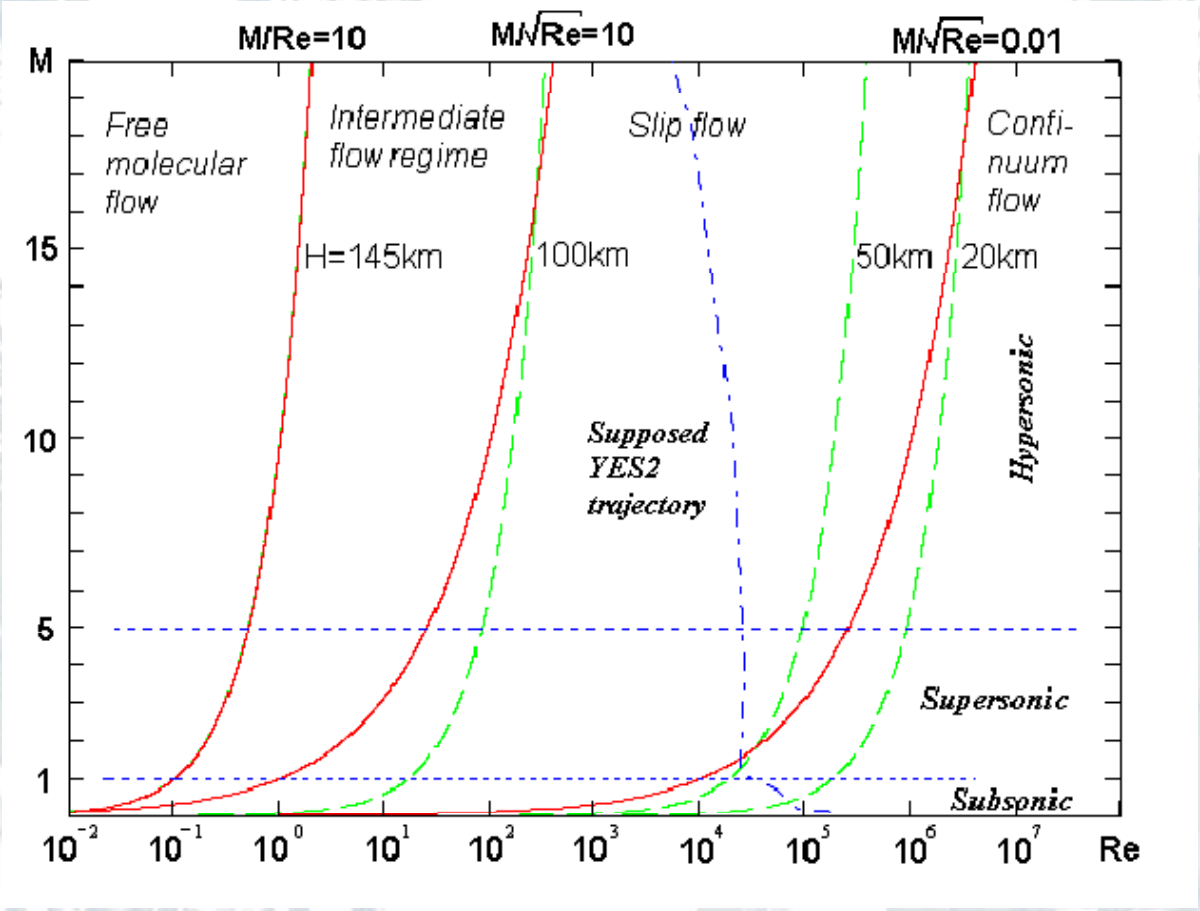
Figure 1 Geographical location of YES2 Centers of Expertise





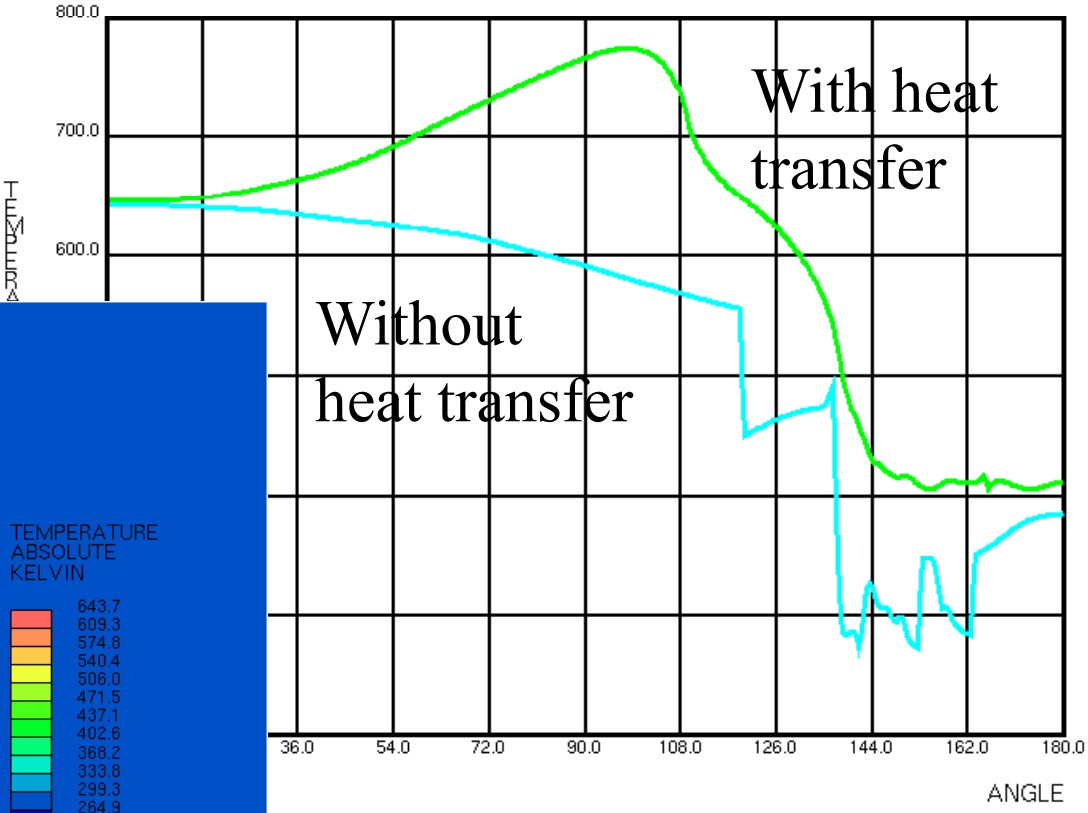
AERODYNAMICS OF RE-ENTRY CAPSULES

A.S. LYASKIN, V. G. SHAKHOV

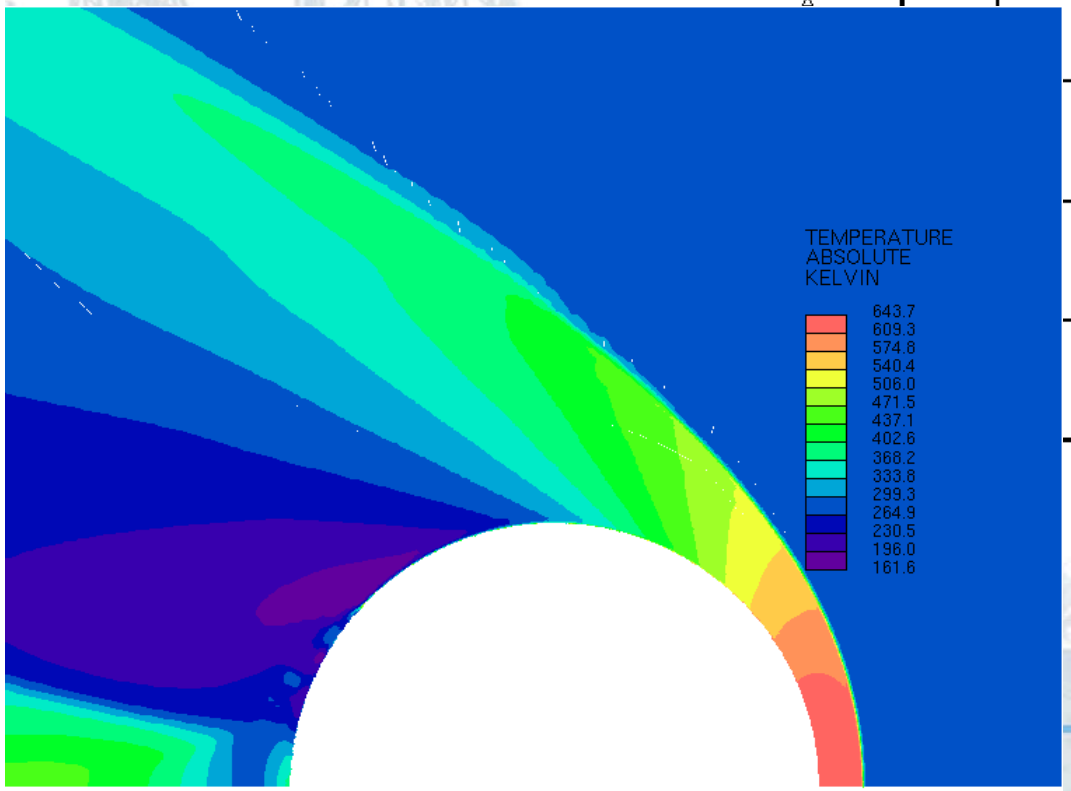


Sphere (Photino), M=3, $Re \approx 6 \cdot 10^5$, T_{0body}=293K

Surface temperature

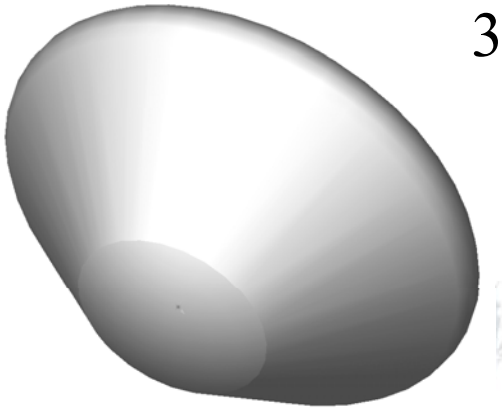


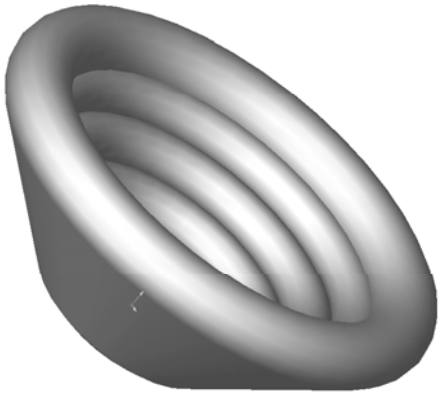
Flow temperature



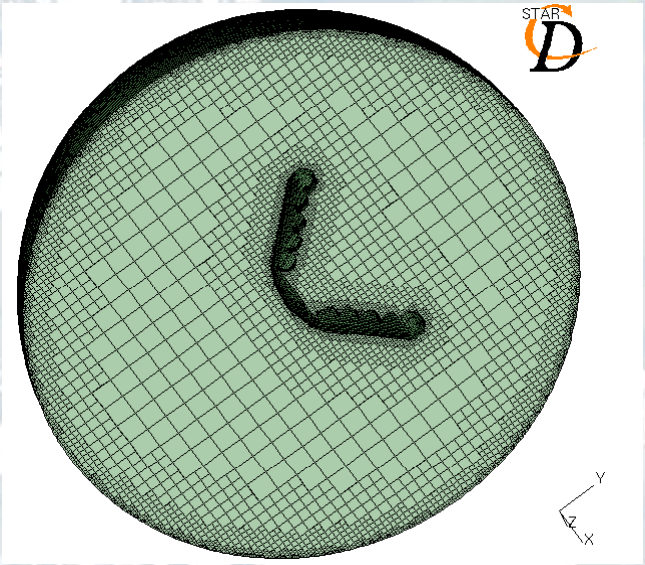
YES2 AIR

3D CAD model

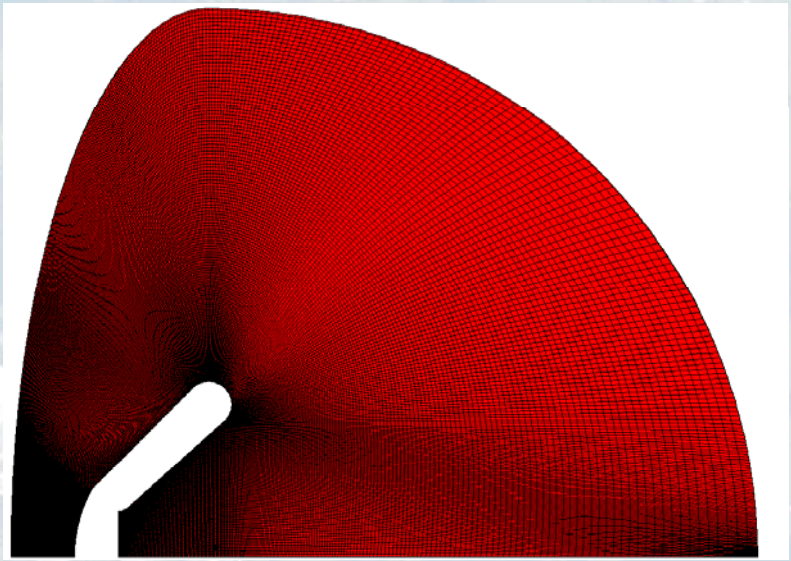




3D FV mesh (Star-CD, SSAU)

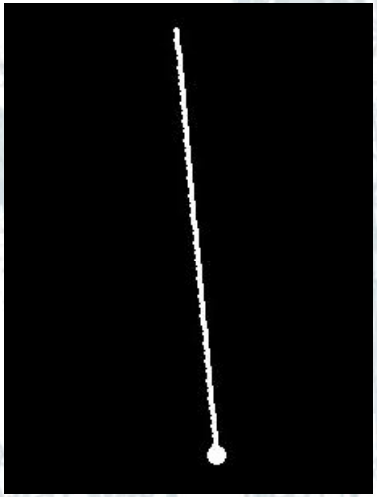


2D FV mesh (Fluent, Marco)



Motion of block MASS with the tether the extra-atmospheric stage of deorbit

Y. Zabolotnov



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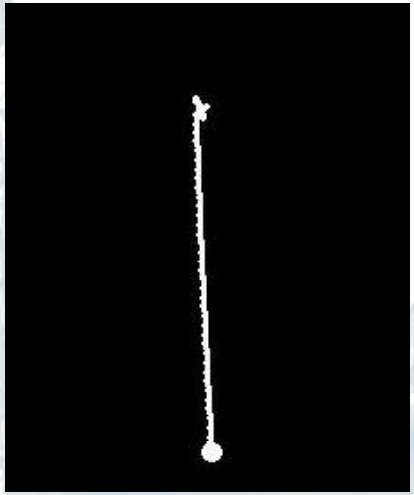

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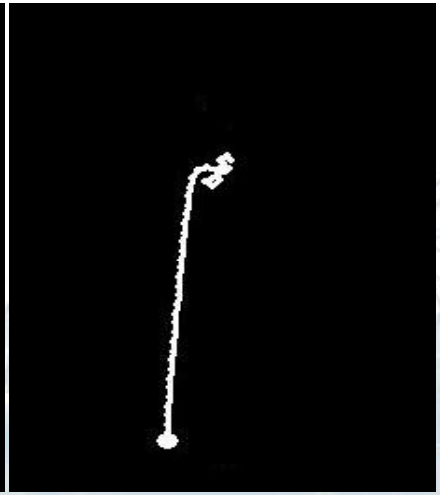

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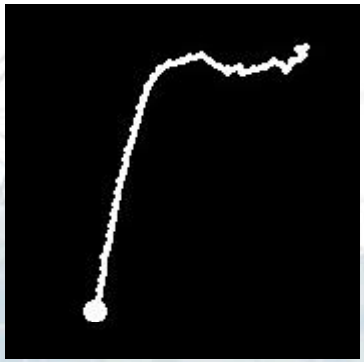

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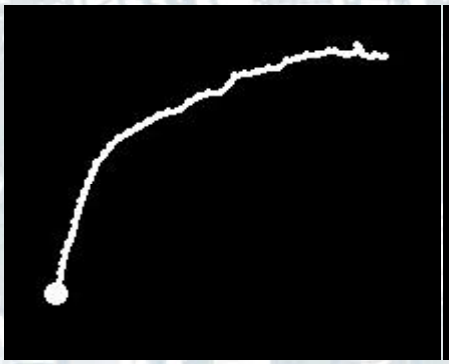

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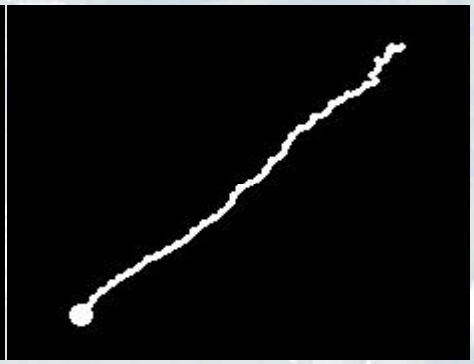

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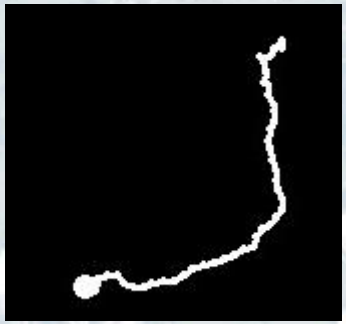

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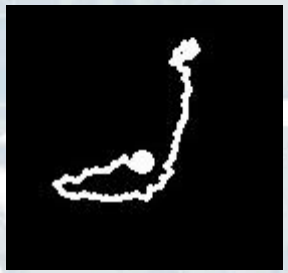

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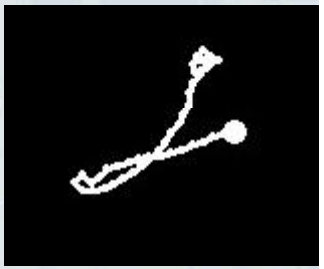

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t = 1250 sec

t = 1278 sec

t = 1279 sec

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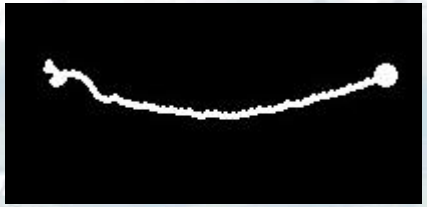

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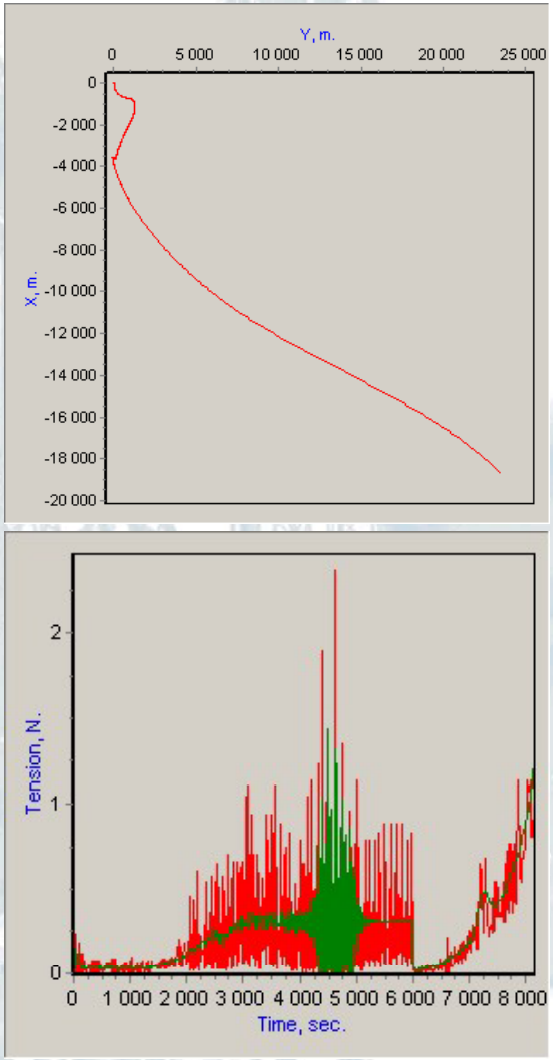
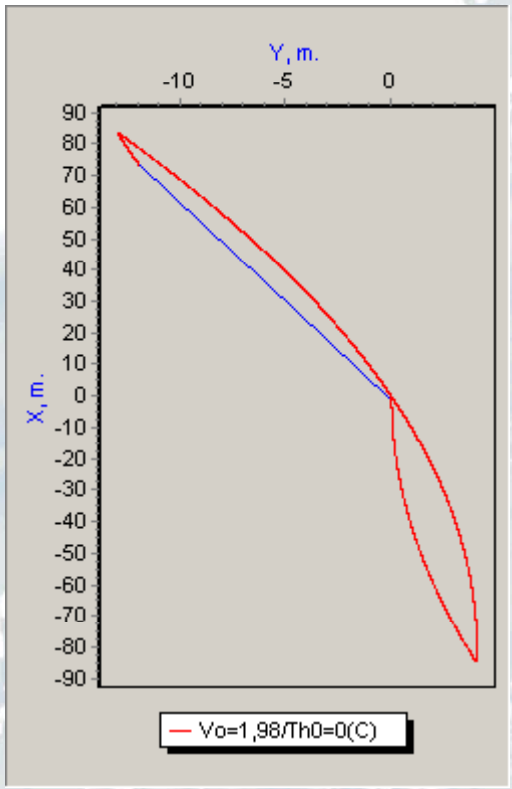
Mission Safety Analysis And Deployment Control

Prof. S. Ishkov





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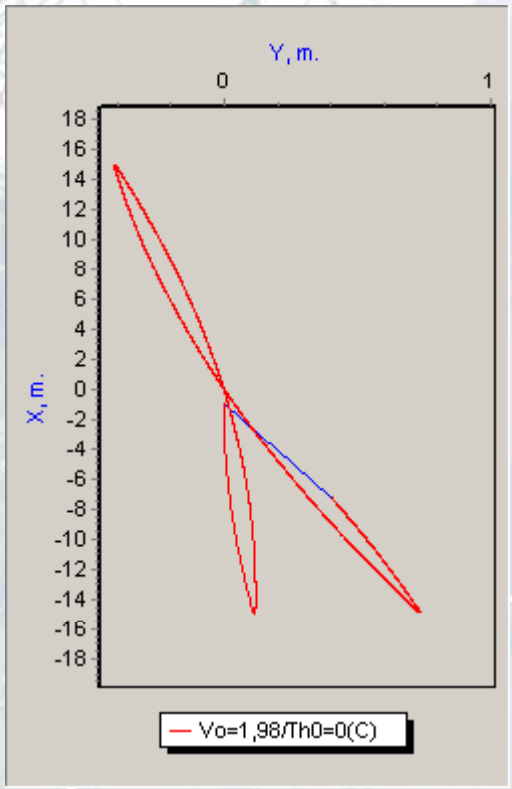

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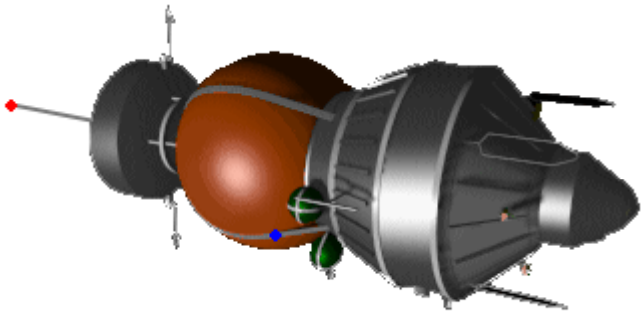
2005

SSAU space experiments on board Foton-M2



MIRAGE-M equipment:
six magnetometers,
GPS/GLONASS receiver ,
block of electronics,
mass – 6,0 kg, power – 4 w

CLEANNESS equipment :
two dust sensors,
two ionic filling flow sensors,
five electrization sensors,
block of electronics,
mass – 5,0 kg, power – 3 w

List of experiments, assignment and content of the equipment

The name of experiments	Using equipment	Expected results
Sertification	MIRAZH-M	-Model of distribution of a magnetic field in a compartment of scientific instrumentation, -Technique of formation of requirements to lay-out and accommodation of scientific instrumentation, -Estimation of influence of internal magnetic fields on results of scientific and technological experiments
Navigator	MIRAZH-M	-Recovery of motion of SV Foton-M2 concerning center of mass, -The substantiation of statement expediency of a damping system of oscillations on SV Foton-M2 (the patent is received), -Technology of creation of the integrated navigational systems on base commercial OEM-plates, testing of the navigational receiver -Testing of the navigational algorithms realizing differential mode and techniques of accelerated forecasting of low-orbital space vehicle
Microgravity	MIRAZH-M CHISTOTA	-Detection of the oscillatory occurrence reasons of SV Foton-M2 motion, -Estimation microgravity, caused by aerodynamic braking, -Estimation microgravity, the caused activity scientific and technological instrumentation and onboard systems, -The design solutions directed on reduction of a microgravity level
Virtual Foton	MIRAZH-M	-Testing of information technology for tracking space experiments; -Granting of access to all persons to the information and events in orbit

List of experiments, assignment and content of the equipment

The name of experiments	Using equipment	Expected results
Space Dust	CHISTOTA	-Parameters of space dust (concentration, speed, the size firm of low-speed dust particles) of the SV Foton-M2 external atmosphere, -Purity degree estimationof the SV Foton-M2 surface
Potential	CHISTOTA	-The gear of charge and discharge of the SV Foton-M2 surface, - Distribution of charges on a surface of a descent capsule of SV Foton-M2
Plasma	CHISTOTA	-Estimation of SV Foton-M2 charge degree concerning space plasma, -Eestimation of space plasma change dynamics
Atmosphere	CHISTOTA	-Estimation of Earth high atmosphere density, -Estimation of SV Foton-m2 ballistic factor, -Motion forecasting technique refinement on low-altitude orbits

2006

The Third Russian – European summer space school "Future space technologies and experiments in space"

August 8 - 12

Delft University – 33 students, 2 professors

August 14 - 18

Design and construction of small satellite "Eol" – 10 SSAU students

August 18 – 30

Lectures of Professor Emile J. SCHWEICHER, Belgium
RMA (Royal Military Academy) OMRA (Optronics & Microwaves)

- Stealth (illustrated by some SAR images)
- SAR (Synthetic Aperture Radar)
- Lidar (i.e., laser radar)
- Hyperspectral sensors
- IR sensors (i.e., thermal imagers)
- Laser weapons
- Holography and applications like holographic interferometry , holographic optics, head up displays , helmet mounted displays ,holo-goggles
- Thz waves and their use for,e.g., Non Destructive Inspection, Security inspection

Thank you very much for attention

Igor Belokonov

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