

## ***The status and perspectives of rocket propulsion research in Italy***

Francesco Nasuti

Sapienza University of Rome

Solid, hybrid and liquid rocket propulsion, together with electric propulsion constitute the present mean to generate thrust for space access and operations. Today new solutions and improvements of concepts are being proposed following an increased competition in the field of launchers, investments from agencies and miniaturization of payloads.

The symposium is aimed at gathering national and international experts in rocket propulsion with the purpose of:

- Providing an instantaneous picture of current rocket propulsion research in Italy
- Providing a picture of planned rocket propulsion research activities in the short and long term
- Identifying complementary activity to set up common researches and strengthening research networks in the field of rocket propulsion

Papers are sought from university and research center teams as well as industries and agencies that describe research overviews or specific researches related to rocket propulsion progress, including performance, modeling, testing, and system and market analyses.

## **SYMPOSIUM N. 5**

# **THE STATUS AND PERSPECTIVES OF ROCKET PROPULSION RESEARCH IN ITALY**

**Chaired by Prof. Francesco Nasuti**

Dipartimento di Ingegneria Meccanica e Aerospaziale  
Sapienza University of Rome

## **Keynote Speaker**

**Prof. Marcello Onofri**

Dipartimento di Ingegneria Meccanica ed Aerospaziale  
Sapienza University of Rome

## **PROPULSION RESEARCH IN THE PERSPECTIVE OF NEW EUROPEAN LAUNCHERS**

**Paper N. 1 OVERVIEW ON THE ACTIVITIES PROMOTED BY THE ITALIAN  
SPACE AGENCY IN THE FIELD OF LIQUID PROPULSION** - Alessandro Gabrielli,  
Emanuela D'Aversa, Marco Pizzarelli

**Paper N. 2 CIRA SPACE PROPULSION ACTIVITIES: ACTIVITIES AND  
OUTLOOK** - Francesco Battista

**Paper N. 3 AN IODINE FEEDING SYSTEM FOR HALL-EFFECT ELECTRIC  
PROPULSION**  
Alfio E. Vinci, Manuel M. Saravia, Luca Bernazzani, Alessio Ceccarini, Fabrizio Paganucci

**Paper N. 4 - STATUS AND ACHIEVEMENTS OF THE HYDROGEN PEROXIDE  
CHEMICAL PROPULSION RESEARCH AT PADUA UNIVERSITY**  
F. Barato, N. Bellomo, A. Ruffin, M. Santi, E. Paccagnella, M. Franco, D. Pavarin

**Paper N. 5 A SIMPLIFIED APPROACH TO PREDICT IGNITION TRANSIENT IN  
A SOLID ROCKET MOTOR USING ROBOOST SIMULATION TOOL**  
F. Ponti, S. Mini, A. Annovazzi

**Paper N. 6 MODELING OF PARAFFIN-BASED FUEL COMBUSTION IN HYBRID  
ROCKETS** - G.D. Di Martino, S. Mungiguerra, C. Carmicino, G. Gallo, R. Savino

**Paper N. 7 CONJUGATE HEAT TRANSFER ANALYSIS FOR ROCKET COOLING CHANNELS BY RANS AND DNS APPROACHES** - Andrea Torricelli, Francesco Nasuti and Sergio Pirozzoli

**Paper N. 8 MODELING OF FLOW SURFACE INTERACTION IN HYBRID ROCKETS** - Daniele Bianchi, Mario Tindaro Migliorino<sup>2</sup> and Francesco Nasuti

**Paper N. 9 ESTIMATION OF THROAT HEAT FLUX IN LIQUID ROCKET ENGINES** - Pierluigi Concio, Mario Tindaro Migliorino and Francesco Nasuti

**Paper N.10 FLOW SEPARATION STABILITY IN DUAL BELL ROCKET NOZZLES.** - Emanuele Martelli, Simone D'Alessandro, Francesco Nasuti, M. De Rosa

**Paper N. 11 ROCKET PROPULSION RESEARCH AT POLITECNICO DI TORINO: FROM HYBRID ROCKET ENGINES TO ADVANCED NOZZLES** - L. Casalino , A. Conte, A. Ferrero , F. Masseni , D. Pastrone

**Paper N. 12 AEROSPACE PROPULSION RESEARCH ACTIVITIES AT SPLAB. OVERVIEW AND RESULTS** - L. Galfetti, F. Maggi<sup>1</sup>, C. Paravan, S. Dossi, G. Colombo, A. Verga, S. Carlotti, R. Bisin, F. Piscaglia

**Paper N. 13 DEVELOPMENT AND IMPLEMENTATION OF A NEW MODEL FOR THE ESTIMATION OF THE ION NUMBER DENSITY IN GRIDDED ION THRUSTERS PLUME** - A. Binci, A. Marchetti, A. Adriani , F. Scortecci

**Paper N. 14 IGNITION OF HIGHLY REACTIVE ALUMINUM POWDERS FOR ROCKET PROPULSION**  
S. Dossi, F. Maggi, C. Paravan, A. Verga, L. Galfetti

**Paper N.15 REGRESSION RATE AND COMBUSTION EFFICIENCY IN A ORTEX-FLOW HYBRID ROCKET ENGINE** - Christian Paravan, Riccardo Bisin, Alberto Verga, and Luciano Galfetti

**Paper N. 16 PRELIMINARY EVALUATION OF A MEMS-BASED WATER PROPELLANT VAPORIZING LIQUID MICROTHRUSTER FOR SMALL SATELLITES**  
M.G. De Giorgi, D. Fontanarosa, L. Francioso, E. Pescini, A. Suma, A. Ficarella

**PAPER N. 17 WALL HEAT TRANSFER SIMULATIONS IN SINGLE AND MULTI INJECTORS GCH4/GOX ROCKET COMBUSTORS**  
G. Indelicato, P. E. Lapennay, D. Durigonz, F. Cretax