El-Genk

SPACE TECHNOLOGY AND APPLICATIONS INTERNATIONAL FORUM—STAIF 2007

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SPACE TECHNOLOGY AND APPLICATIONS INTERNATIONAL FORUM—STAIF 2007

11th Conference on Thermophysics Applications in Microgravity
24th Symposium on Space Nuclear Power and Propulsion
5th Conference on Human/Robotic Technology and the Vision for Space Exploration
5th Symposium on Space Colonization
4th Symposium on New Frontiers and Future Concepts

Albuquerque, New Mexico 11 – 15 February 2007

EDITOR
Mohamed S. El-Genk

AMERICAN INSTITUTE OF PHYSICS

AIP CONFERENCE PROCEEDINGS ■ 880

SPACE TECHNOLOGY AND APPLICATIONS INTERNATIONAL FORUM—STAIF 2007

SPACE TECHNOLOGY & APPLICATIONS INTERNATIONAL FORUM (STAIF-2007)

February 11 - 15, 2007

"Space Renaissance: Inspiring the Next Generation"

11th CONFERENCE ON THERMOPHYSICS APPLICATIONS IN MICROGRAVITY

24th SYMPOSIUM ON SPACE NUCLEAR POWER AND PROPULSION

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Melville, New York, 2007
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INTRODUCTION

I am pleased to introduce the Proceedings of the Space Technology and Applications International Forum (STAIF-2007), held February 11-15, 2007, in Albuquerque, New Mexico and organized by the University of New Mexico's Institute for Space and Nuclear Power Studies (ISNPS) The Forum's theme: "***Space Renaissance: Inspiring the Next Generation,"*** is the focus of the plenary sessions and the technical program of this four-day, annual meeting.

The STAIF-2007 technical program features a broad spectrum of topics on: space nuclear power and propulsion, space science and technology; space exploration; space colonization; advanced radioisotope power systems; thermophysics applications in microgravity; energy conversion; nuclear fuel and high temperature materials; high power electric propulsion, testing and evaluation; heat pipes, capillary pumped loops and advanced radiators; simulation and modeling; and advanced propulsion physics. These topics span the range from basic research to the most recent technology advances and hardware development and testing.

STAIF continues to provide excellent opportunities for interaction and informative dialogue among the attendees from academia, industry, and government. As in previous years, STAIF-2007 hosts a number of concurrent conferences on closely related topics, which stimulate discussions, enrich technical interaction, and help the dissemination of knowledge among the attendees. The hosted conferences at STAIF-2007 are:

11th Conference on Thermophysics Applications in Microgravity; *Chairs: Ted Swanson,* NASA Goddard Space Flight Center, and *Tung T. Lam,* The Aerospace Corporation

24th Symposium on Space Nuclear Power and Propulsion; *Chairs*: *Garry Burdick,* Jet Propulsion Laboratory, and *Michael Houts,* NASA Marshall Space Flight Center

5th Conference on Human/Robotic Technology and the Vision for Space Exploration; *Chairs: John Mankins,* NASA Goddard Space Flight Center, *Robert Wegeng,* NASA Headquarters, Office of Exploration Systems, and *Christopher Moore,* NASA Headquarters

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4th Symposium on New Frontiers and Future Concepts; *Chairs*: *Paul Murad,* U.S Department of Defense and *Glen A. Robertson,* NASA Marshall Space Flight Center

The technical program for STAIF-2007 offers 251 presentations in 64 sessions. We are very grateful to the members of the executive committee and the technical program committees of the participating conferences for their hard work, dedication, and contribution to this year's technical program. In addition, we wish to express our great appreciation to the authors for their contributions to this year's archival proceedings containing full text papers and to the speakers for their contributions to the technical program. The STAIF-2007 proceedings, published by the American Institute of Physics in a searchable CD and hardbound book format, are distributed worldwide.

In addition to the technical program, STAIF-2007 features two plenary sessions entitled: ***Inspiring the Next Generation*** *and* ***Enabling the Space Renaissance,*** at which prominent speakers are invited to address timely topics related to this year's theme. The Forum's General Chair is ***Donald D. Cobb,*** Los Alamos National Laboratory (retired), and the General Co-Chair is ***Brewster Shaw,*** The Boeing Company. These planetary sessions are organized by the STAIF-2007 organizing committee in collaboration with members of the Steering and Executive Committees.

As in previous years, the program for STAIF-2007 also features a half-day educational outreach program on the first day of the meeting to secondary school students interested in space exploration and science.

This annual outreach program, serving secondary school students and teachers throughout New Mexico, celebrates its 19th anniversary this year with the display and judging of student entries to this year's space design competition, **"Mars Mobile Laboratory."** In addition, the outreach program includes a special session with featured speakers to address timely topics to the attending high school students, teachers, and parents. More than 150 students, teachers, and parents are expected to participate in this year's education outreach activities. Members of the space community attending STAIF-2007 are invited to judge this year's entries to the space design competition, after which winning students and/or teams and their teachers will be recognized at an awards ceremony during the second plenary session. Special thanks are due to the Education Outreach Committee organizing these worthwhile events, ***Susan Ostlie*** of the Albuquerque Public Schools, and ***Jon Webb, Jack Parker,*** and ***Timothy Schriener*** of the University of New Mexico's Institute for Space and Nuclear Power Studies. This annual outreach program is sponsored by *the University of New Mexico's Institute for Space and Nuclear Power Studies (ISNPS)*.

Special thanks are due to the Staff of the Institute for Space and Nuclear Power Studies, ***Claudia O'Keefe,*** STAIF-2007 Administrative Chair, and ***Mary Bragg***, Administrative Co-Chair, for their dedication, leadership and excellence in handling many of the challenging tasks they have encountered in the course of completing this year's program. Many thanks are also due to the graduate and undergraduate students who assisted in the many activities for their dedication, hard work, and commitment to making this annual event a success. The efforts and contributions of these individuals are critical to the successful organization of a large, international event such as STAIF-2007.

On behalf of the Steering, Advisory, Executive Committees, and technical committees, we wish to express our thanks to the professional societies co-sponsoring this year's conference, the sponsoring organizations from government, industry, national laboratories and the many national and international organizations participating this year, for their input and contributions to the program. We also wish to acknowledge the contributions of the exhibitors for their timely and informative displays on the latest in space technology, which have always been an important and integral part of this annual meeting's success.

We are grateful to the organizers, chairs and co-chairs of the technical and plenary sessions, the speakers, and members of the STAIF organizing, Steering, Executive and Advisory Committees for their relentless effort in developing this year's theme and helping in the organization and planning of the plenary sessions. Without the commitment, dedication, and contribution of each of these individuals, sponsoring and participating organizations, exhibitors, and the numerous organizers of the various events, this year's meeting would not have been possible.

My heartfelt thanks go to the families of the Institute for Space Nuclear Power Studies (ISNPS) staff and students for their understanding, patience, and continued encouragement and support through the demanding task of organizing this year's events. Special thanks are due to the University of New Mexico, its School of Engineering, and the Department of Chemical and Nuclear Engineering, for the continued support, encouragement and interest.

Mohamed S. El-Genk
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