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This volume is a compilation of the papers presented at the 9th International Space Conference of Pacific-Basin Societies (ISCOPS) held at Pasadena, California, in November 2001. Started as a joint symposium of the AAS and Japanese Rocket Society (JRS) in 1985, the name ISCOPS was adopted subsequently after discussing the characteristics of these conferences. The ISCOPS symposia are now held every two years through the combined efforts of the AAS, JRS and the Chinese Society of Astronautics (CSA). These symposia pertain to the advances made in space sciences and rocketry in the Pacific-basin countries. The theme of the 9th ISCOPS is also the title of this volume.

Of the over 100 papers accepted only 33 were actually presented at the conference and are included in this volume. They cover a large number of topics—astrodynamics, guidance and control, remote sensing and meteorology, space transportation and propulsion, materials and structures, space station and environment, space debris and manned space flight. Presumably, all the papers are peer-reviewed and represent original contributions of the authors.

A bird's eye-view of the national space program of Japan reveals the past failure of its H-II and M-V rockets, and the subsequent success of the first flight of H-IIA rocket last year. Space missions planned for up to 2020 reflect the meaningful purpose of the Japanese space activities. Although similar review papers covering space programs of other countries, like India, China and the US are listed, it is disappointing to note that they are not available in this volume.

The technical papers cover some interesting topics. For example, anticipating traffic congestion in the outer space, W. O. Glascoe has already established an Earth Outer Space Organization (EOSO). Its main task is to design the Earth outer space traffic control system to control circumterrestrial traffic and manage space safety risk. A brief outline of the operation and typical analyses are given in his paper.

The hybrid rockets are not new but their designs differ. Yet, another new type of safe and low-cost staged combustion hybrid rocket is proposed. Its burning mode resembles the end burning grain of the solid rocket since its fuel bed burns from the bottom end. Its applicability to fully reusable sounding rockets and space tugs has been evaluated. Reusable rockets are the demands of the future because of their overall low cost. A fully reusable rocket vehicle comprising clustered liquid hydrogen engines is proposed by the Japanese. It could be used as a sounding rocket and has the capabilities of ballistic flight, returning to the launch site, and landing vertically. Another paper describes the flight results of the Japan's H-IIA launch vehicle, which was launched successfully last year.

An article from Lockheed Martin Space Systems describes Atlas-V, the next generation of affordable, operable and reliable launch system. Atlas-V features a common core booster using the flight-proven Russian RD-180 engine, the common element Centaur, and advanced avionics. It is capable of meeting a wider range of customer needs at a less cost and is believed to be ready in 2002.

Application of remote-sensing satellites to agriculture is fairly well established. Newer uses cover issues involving agriculture management, resources, disasters, available planting area, etc. Vegetation analysis using leaf-water content index calculated from spot/vegetation data by remote sensing has been proposed.

Small satellites, also known as FBC (faster, better, cheaper) because of their low cost have made significant impact on the number of scientific missions—an impressive three-fold increase in the past decade. There have been failures too, which have raised doubts on the merits of FBC, but a better risk management is likely to enhance their success.

Collision risk assessment of spacecraft with space debris is a critical area. A risk analysis of debris produced by explosion of a Chinese satellite into LEO recently is presented. There have been cases of explosion or breakup of satellites in the geosynchronous Earth orbit too. Break-up pieces (debris) having bigger than 1 cm diameter have been catalogued. The break-up debris clouds of smaller particles have been analyzed using simulations. The effect of the impact of space debris on the bumper shield of spacecraft has been evaluated numerically. When space debris between 1 and 10 cm diameter collides and penetrates the shield, the pressure in the module starts decreasing rapidly. The development of a self-shielding bumper against space debris by the Japanese scientists is a step in the right direction. The self-shielding bumper prevents a rapid pressure drop and maintains a certain pressure until the crew can escape from the depressurized module to the safer part of the spacecraft.

Manned exploration of Mars is a favorite distant project of space scientists. Efforts are under way to develop technologies necessary for a range of human missions. The use of International Space Station as a human exploration test-bed is advocated. The ISS is well suited to study problems relating to physiological counter measures to microgravity, radiation and crew isolation, and also carrying out systems improvements, operations process, etc. Evaluation of minimum fuel trajectories for sample return from Mars using solar electric propulsion has been carried out. It has a bearing on the staying period on the planet. It is shown that the going trajectory changes in the case of longer staying period and the returning trajectory changes in the case of shorter staying period. Another paper cites a rather distant dream for establishing an international lunar base to conduct large-scale operations in space independent of Earth resources, which will benefit people of the Earth from vast energy and material sources of space.

In a way the papers published in this volume are on similar lines as those presented in the seventh ISCOPS covered in the AAS Vol. 96, which this reviewer had the privilege to review here earlier. The title of the volume is somewhat inapt, as there are

no articles or proposals relating to 'cooperation among all Pacific basin countries'. In fact, the volume covers the proceedings of a normal technical conference. Also, as indicated by the authors and their affiliations there is hardly any participation from other countries, besides Japan and USA, perhaps because the conference was held soon after the 9/11 incident.

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