

IAF SPACE TRANSPORTATION SOLUTIONS AND INNOVATIONS SYMPOSIUM (D2)
Technologies for Future Space Transportation Systems (5)

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FUTURE SPACE TRANSPORTATION TECHNOLOGIES

Abstract

The development of space transportation systems is crucial for the future exploration and exploitation of space. As space agencies and private companies continue to invest in space travel, the need for more efficient, cost-effective, and reliable transportation systems becomes increasingly important. One of the most promising technologies for future space transportation systems is reusable rockets. Reusable rockets, such as SpaceX's Falcon 9, have the potential to dramatically reduce the cost of space travel by allowing rockets to be reused multiple times. In addition to lowering costs, reusable rockets also reduce the amount of debris left in space, making it a more sustainable solution. Another technology that is likely to play an important role in future space transportation systems is electric propulsion. Electric propulsion systems, such as ion thrusters, have the potential to significantly reduce the amount of propellant needed to travel to and from space, making space travel more efficient and cost-effective. These systems are also ideal for long-duration missions, as they require less fuel than traditional chemical rockets. Additive manufacturing, also known as 3D printing, is another technology that is expected to revolutionize space transportation systems. 3D printing enables the production of complex parts and components in space, reducing the need to launch pre-made parts from Earth. This could significantly reduce the cost of space travel, as well as improve the reliability of space vehicles by allowing for on-demand production and repair of parts. Autonomous systems are also likely to play an increasingly important role in future space transportation systems. Autonomous systems, such as robotic vehicles, can perform tasks such as assembling structures and conducting repairs without the need for human intervention. This could significantly reduce the risks associated with human space travel, as well as enable the exploration of more distant and dangerous regions of space. Finally, advances in materials science are expected to play an important role in the development of future space transportation systems. New materials, such as carbon nanotubes and graphene, have the potential to significantly improve the performance and efficiency of space vehicles, while also reducing their weight and cost. In conclusion, the development of future space transportation systems will rely heavily on emerging technologies such as reusable rockets, electric propulsion, additive manufacturing, autonomous systems, and advances in materials science. These technologies have the potential to significantly reduce the cost of space travel, improve the reliability of space vehicles, and enable the exploration of new regions of space. As space agencies and private companies continue to invest in space travel, it is likely that these technologies will play an increasingly important role in the development of future space transportation systems.