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DEVELOPMENT (D3)

Systems and Infrastructures to Implement Sustainable Space Development and Settlement - Systems (2A)

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VACUUM TRANSPORT SYSTEM FOR MOON

Abstract

On the basis of previous own papers connected with Hyperloop type transportation systems for Earth and Mars similar concept for Moon is considered in the paper. The second race to the Moon has begun and is developing towards establishing a permanent presence of the humans on the lunar surface. One of the biggest problem arising for space colonists is people and goods transportation inside colonies and between them. In the paper the concept of the vacuum transport system and the main challenges connected with building stable mean of transport on the Moon are presented.

The history of the Moon exploration programs with the brief description of the future projects is presented. The scope of planned lunar bases and plans for the lunar settlement is also covered. The outline of the terrain and geological structure of the Moon with the regolith structure and lunar soil description is presented.

Conditions on the Moon are much more severe than on the Earth and even on the Mars. Lunar transportation system have to cope with extreme temperatures (-233C 280C), vacuum, electrostatic dust and many other challenges unknown at the moment. In the paper conditions important for transport on Moon are discussed in details and problems of the implementation of the vacuum transport technology are formulated.

The theoretical calculation of the transport system movement is presented. The assumptions about the technology and power consumption are formulated. The scope of the main systems of the original polish 4P system for the Moon is presented including: tunnels, the vehicle itself, power system, stations and the others.

One of the most crucial elements of the conception is to prepare the system which could be produced entirely or mostly on the Moon. It can significantly reduce costs and shorten the time to build the whole system. The conception of the usage of the materials from the Earth and from the Moon is presented and the example of the in situ manufacturing is described. Brief cost estimation is performed, showing reality of the whole concept.