

OS2-3

人工重力と月面・火星での居住施設

Artificial gravity and habitation facilities on the Moon and Mars

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1. Introduction

Low-gravity environments such as the Moon and Mars will give humans a fresh, fun, new sense of jumping, falling, ball games, swimming, and all kinds of experiences. And they are sure to expand the boundaries of humanity. If we succeed in space exploration, human history will be richer in the future than in the past. However, it must be an expansion of the scope of life in peace, security, and safety. If we take the current conflicts on Earth with us, we will be inviting tragedy. In this sense, the present, which is the starting point for the advancement into space, is a watershed moment in the history of mankind. Here, I would like to present the issues and solutions that I think are necessary to solve these problems.

2. issue

It is said that there are currently tens of thousands of people who would like to go to the Moon or Mars, even if only one way. It will only be a matter of time before people actually live on the Moon or Mars. Regardless of the pros and cons of going, there will always be people who want to go, and that is the curiosity of the human race. At that time, we cannot say that only those who want to go should go. The first immigrants are the first generation. When thousands or tens of thousands of people live there, it is natural for them to have families there. The second and third generations born there will live in space, even though they do not want to. Forced to live in a harsh environment and at the same time being ill-prepared for the low gravity, they will have bodies that will not be able to stand on their own on Earth. I fear that this will not only be the beginning of the division of the human race, but that they will be deprived of their natural functions as earthlings.

3. Proposal

A solution would be a cradle or growth device using a centrifuge, but this would also create a disconnect between parent and child, and is not recommended. The ideal solution is to live in an artificial gravity facility as close to the earth's environment as possible. My proposal here is an artificial gravity facility on an architectural scale of about 200 meters in diameter that combines the gravity of a celestial body and centrifugal forces. If we can construct an ecosystem in this facility and recreate forests and oceans, we will be able to live a human-like life and maintain a body that can return to the earth.

4. What you can do now

The above-mentioned large scale story can be realized only through steady steps. In particular, it is necessary to know the low-gravity environment such as the lunar surface and try various experiments. Even if we know the basic behavior on the desk, it is important to have actual experience in order to make it useful for actual design and construction, and if this is not possible, experiments will be helpful. The goal may be high, but steady progress is the fastest solution. The experience on the Moon should change the concept of future building, construction equipment, and playground facilities, and all other things necessary for life on the Moon.

In the case of construction equipment, it is of course necessary to apply Earth-based equipment, but that alone is not enough. On the Moon, we cannot effectively utilize vertical reaction forces due to the low gravity. Once that is understood, horizontal reaction forces are considered. And for horizontal reaction force, the technology of digging holes is effective.

5. Conclusion

Space development is still in the exploratory stage. What we can do now and what we envision should be done are two sides of the same coin, and we need to expand the scope of consideration as much as possible. The use of lava tube for radiation countermeasures must also be considered. As for construction, classical architecture may be applicable. In addition, as the number of space travelers increases in the future, there will be people who will go to space on business, such as hoteliers and staff who maintain facilities on the moon and Mars. It will be necessary to consider how to create a comfortable environment for those who are not necessarily interested in space.

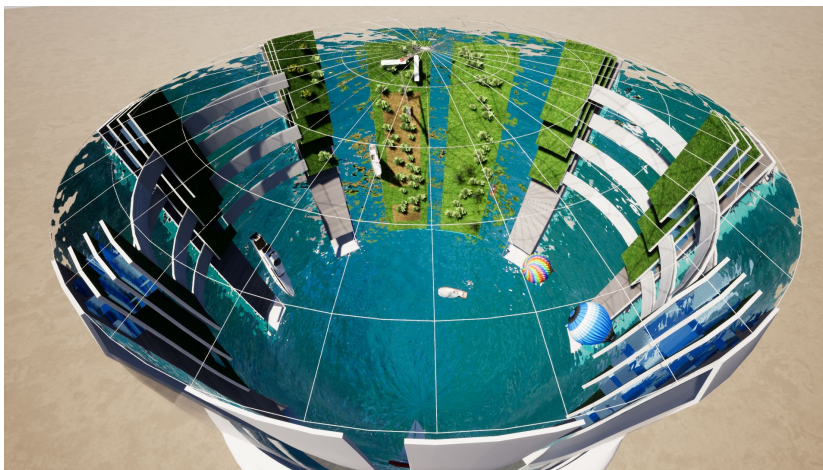


Figure 1. an artificial gravity facility on Mars



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