PREFACE

Who believes not only in our globe with its sun and moon, but in other globes with their suns and moons,
Who, constructing the house of himself or herself, not for a day but for all time, sees races, eras, dates, generations,
The past, the future, dwelling there, like space, inseparable together.

Thus Walt Whitman's poem *Kosmos* concludes its vision of the continuity and coupling between the past handed to us, our present which we create and pass to our children, and the future that they will take charge of. Technology, Science, and presence in Space are among the jewels which we pass to our children. They form the basis with which our children can manage and solve their problems as well as achieve their dreams.

When speaking with the citizenry on the subject of space travel, manned exploration, and colonization of the Moon and Mars, one generally receives incredulous stares from people who, under other circumstances, are sophisticated and urbane. The idea that the Nation is too poor to explore Space, and that every other national need takes precedence over Space Science and Engineering pervades the body-politic. One is thought to be unpatriotic to believe that the Nation benefits tremendously, in high multiples of return, with every extraterrestrial scientific and engineering project. Given this return, the Nation should support vigorous advancements in our ability to travel and support life in space and on the Moon and the planets.

Should we send people into Space and to the Moon? And, why spend such large sums for such "adventures"? The resolution of these issues will certainly not take place here, because on all issues honest people can look at the same facts and yet come down on opposite ends of the policy spectrum. Therefore, our goal here is to state a few of the many compelling reasons to continue manned space science and engineering.

The foremost reason is for the advancement of humanity in the most general sense. Broadened horizons and "unreachable goals" have always brought about the best in us, and therefore, we owe it to ourselves to search for such opportunities and pursue them vigorously. Space is ideal in this sense: It is vast, and it may truly be unconquerable. But in trying to master our understanding of Space and our abilities to navigate and populate it, we are learning most about ourselves and our history, and mostly we are creating a future which is limitless in opportunity. We owe our children an avenue for evolving beyond common concerns. This does not in any way imply that common concerns are unimportant. They are equally important, but they also take up most of our talent, time, and resources. Therefore, they are well taken care of, thus allowing a small part of the national effort to work for the future well-being of our people.

Embodied in the above vision are many components. Each is a significant part of a national effort in Space:

- lunar and planetary science and astronomy
- lower gravity physiology and medicine
- testbed for technologies required to place humans and machines on Mars and beyond
- attracting our young to science and engineering
- utilization of lunar resources.

This special issue of *Applied Mechanics Reviews* was created as a testimony, by the authors, to the importance of a continued presence in Space by representatives of this Nation. We have tried to examine some, but obviously not all, issues which are pertinent to the establishment of a permanent manned facility on the Moon. Hopefully, the interested reader will come away with enough information to permit a further, more advanced study. We have endeavored to provide broad perspectives rather than too narrow a focus. Structural concepts for the Moon are in flux. The first generation of bases will most likely be brought almost intact from Earth orbit, ready for habitation. More advanced bases, like those envisioned here by NASA artists, built of indigenous materials, will require many decades of research and development, analysis, design, and construction.

All of this implicitly assumes that the citizenry understands that such activities benefit us and our children in many ways materially and spiritually. On this foundation of support our elected leaders can set visionary policy, provide statesmanship, and allocate the necessary resources to fulfill these goals.

As the editor of this special issue, I am pleased to thank all the authors of the papers personally, and to thank Pete Conrad for agreeing to open this special issue with his thoughts on all this. All of us who worked on this special issue have performed out of personal conviction and on private time. We are all grateful that our respective organizations have provided us with the environments necessary for this work. I dedicate this special issue to our children.

Haym Benaroya, Guest Editor