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Space- from foray to habitation

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Abstract

In five decades of human space flight, no human has yet traveled in interplanetary space and missions have been a succession of relatively brief forays. But the future prosperity, and survival of humanity requires a *habitation paradigm* in which travelers journey to off-world locations in order to stay and work, ultimately creating a space-faring society capable of harvesting the enormous resources of the Near Earth and main belt asteroids as well as planetary bodies. This plenary address discusses a plan for the human habitation of the solar system made possible by harnessing a variety of emerging mechanical and aerospace technologies. These include: Design of interplanetary spacecraft that counter the debilitating effects of zero gravity, advanced radiation shielding, life support systems, propulsion systems, and advanced trajectory designs. In the area of life support, *habitation technology* is an integrated, portable system of systems that enables small human groups to generate their own consumables, mine *in situ* resources, and replace their own tools. The constituent technologies, including autonomous control software, presently exist in some form but remain to be refined, integrated and harnessed. Concepts for interplanetary spacecraft that are sufficiently massive to provide travelers with a safe and healthy environment for prolonged missions can achieve the necessary mobility from both propulsion advances and intellectual advances in trajectory design that accomplish travel over immense distances with very little propellant consumption. We emphasize that none of the technologies mentioned are speculative; all are based on established principles and are at or near the necessary adaptation.

Biography

David Hyland earned the S. B., M.S. and Ph.D. degrees at MIT in 1969, 1971 and 1973, respectively. Through 1983, Dr. Hyland was staff member of the MIT Lincoln Laboratory. Beginning in 1983, he led an advanced technology group at Harris Corporation and became Senior Scientist. He joined the University of Michigan in 1996 as Professor and Chairman of Aerospace Engineering. In 2003 he joined Texas A&M University as Associate Vice Chancellor, Associate Dean of Research, and Professor of Aerospace Engineering, and Physics. Most recently, Dr. Hyland assumed the position of Director of Space Science and Engineering Research.

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