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Author: Mr. Muhammad Faisul uz Zaman
Pakistan

Mr. Arif Aziz
Pakistan

Mr. Khalid Ishaq
Pakistan

DEVELOPMENT OF 3D CLINOSTAT AND RANDOM POSITIONING MACHINE FOR STUDY OF BIOLOGICAL SYSTEMS UNDER SIMULATED WEIGHTLESSNESS/MICROGRAVITY

Abstract

Development of 3D Clinostat and Random Positioning Machine for Study of Biological Systems Under Simulated Weightlessness/Microgravity

Muhammad Faisul Uz Zaman, Arif Aziz, Khalid Ishaq

Key words: Microgravity, Functional Weightlessness, 2D Clinostat, 3D Clinostat, Random Positioning Machine, Space Exploration

Abstract: Study of biological systems in pursuit of microgravity/weightlessness is an exciting research area and adding a new dimension for researchers throughout the world. Microgravity is an evolutionary and novel domain of space exploration. It enables new ways of handling the orthodox problems. Considering microgravity a tool for space exploration there is a great potential for space product development and application-oriented industrial research. Space borne microgravity experiments are quite expensive and difficult to perform technically. As far as ground-based microgravity experimentation of biological systems is concerned 2D, 3D Clinostats and Random Positioning Machines (RPM) are frequently used for study under simulated microgravity condition or functional weightlessness. Carefully designed experiments and wisely interpreted data can lead to very important conclusions on these ground based microgravity simulators. Once the data is verified in several ways with different conditions the final results would be viable for testing on space-borne microgravity setups. In this context a low cost 3D clinostat/Random Positioning Machine (RPM) is developed at SUPARCO for a variety of biological systems. This covers (but not limited to the) study of mesenchymal stem cells, mammalian cell cultures, aerospace medicines, regenerative medicine, tissue engineering and stem cell research. Developed system is capable to be used for extended duration of experiments for a week or more. In addition to this functions of 3D Clinostat and Random Positioning Machine are combined in a single system for cost effectiveness and experimentation diversity.