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A METHODOLOGY FOR HYPOGRAVITY GAIT ANALYSIS WITH DESIGN APPLICATION

Abstract

In order to support safety and performance through the design of future Moon and Mars habitats, the walking patterns and interactions of astronauts in the interior architecture need to be investigated. Data on anthropometrical and interaction movements need to be collected in order to address the design of the habitat.

In the past, physiological data have been collected without addressing the need for application in the field of architectural design. This research will investigate a methodology that focuses on the collection of basic anthropometrical and postural data needed to develop interfaces for Moon and Mars gravity environments.

The methodology proposed here consists of the utilization of the swimming pool of the Neutral Buoyancy Facility at the European Astronaut Centre. By using a combination of distributed mechanical loads on different parts of a subject's body (and, possibly, floaters to optimize the application point of the resultant force), a realistic reduced gravity effect can be obtained. Optionally, the subject could interact with a Moon or Mars habitat or terrain created within the Neutral Buoyancy Facility. The data will be collected via underwater video recording. The data will be compared with a control study performed using the same structure but outside the water.

As a result, the walking patterns will be visualized schematically and with images. Finally, the methodology will be evaluated in terms of whether or not it can be suggested for further study.