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CONCEPTUAL DESIGN FOR THE ADVANCEMENT OF MECHANICAL COUNTER PRESSURE SPACESUITS

Abstract

With expected increased demand for extravehicular activity in future exploration missions, the superficially simple nature of mechanical counter pressure (MCP) spacesuits holds significant appeal while promising numerous advantages. While traditional gas-pressurised suits have proven reliable for many decades, MCP's skin-tight garments have the potential to offer significant improvements in mobility, dexterity, level of exertion, and safety. Numerous unsolved design challenges exist which have prevented the adoption of this technology. This paper discusses work undertaken towards engineering solutions for some of these issues, prioritising the demonstration of viability in experimental conditions. By considering mechanical components rather than material properties, this project investigates a way to achieve the generation of the large tensions required for a functional MCP suit. The concepts are examined in the context of comfort and donning speed for such a spacesuit. Garment adjustability is also considered to address concerns surrounding changes to body shape during long-duration missions, as well as providing better performance and reduced production costs.