

# A Chameleon Suit to Liberate Human Exploration of Space Environments

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The direct operation of humans in space environments must become commonplace if the goals of the HEDS Enterprise are to be achieved. This transition from rare and expensive Extra-Vehicular Activity (EVA) to normal and expected “going outside” can be enabled by a system concept in which the walls of the protective clothing work with the space environment to provide required thermal control functions. This will liberate future space workers and explorers from reliance on cumbersome mechanisms and consumable resources currently used for thermal control. It will be achieved by providing the ability to tune the heat transmission characteristics of the outer garment from highly insulating as in present spacesuit designs to highly transmissive. This will allow heat flow from the body to be modulated to match varying metabolic activity levels in any environment and permit selective control on different garment surfaces to take advantage of the most advantageous thermal conditions at any work site. This study is proposed to evaluate the implications of the “Chameleon Suit” system concept that integrates emerging technologies for varying conductance/convection insulation with controllable radiation emissivity surfaces. We will assess concepts for its implementation and required technology development beyond currently emerging and projected technologies to make it a success.

