

**ACOUSTICS2008/3391**  
**Acoustic and vibration measurements of NASA spacesuits**

Durand Begault, James Hieronymus and Bernard Adelstein  
NASA Ames Research Center, Mail Stop 262-2, NASA ARC, Moffett Field, CA 94035, USA

Research was conducted to examine interactions between acoustic signals and mechanical factors relevant to the design of improved auditory displays and noise mitigation for future NASA Spacesuits. Data were collected at NASA Johnson Space Center for the current Mark III advanced prototype surface suit during walking, walking with arm motion, and while seated. Measurements were made using multiple microphones (both head mounted and helmet mounted) and a tri-axial accelerometer to evaluate the effects of suit-borne vibration on overall background noise. Footfall impacts were found to create temporary depolarization of condenser microphone signals, and microphone positioning had a strong effect on signal-noise ratio, partially due to the effect of the helmet enclosure. The results indicate noise mitigation and signal conditioning strategies for improving lunar suit audio voice communications under extra-vehicular (EVA) conditions. Funded by a directed research program of NASA's Space Human Factors Engineering project and by NASA-JSC's Constellation EVA system audio group.