Full Name (English):	Haifeng Zhao	Recent Photo 
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Biography
(Please provide in paragraph form within 500 words.)

Dr. Haifeng Zhao serves as a Professor at the Technology and Engineering Center for Space Utilization, Chinese Academy of Sciences, and the School of Aeronautics and Astronautics, University of Chinese Academy of Sciences. He earned his Ph.D. in Engineering Mechanics from the University of Texas at Austin, USA. Following his doctoral studies, he spent over a decade at a globally renowned Fortune 500 industrial R&D institution, leading advancements in engineering equipment for aviation, aerospace, and energy exploration. Currently, his research is centered on addressing cutting-edge challenges in aerospace, aviation, and energy industries, with a particular focus on designing intelligent systems for extraterrestrial exploration robots and developing advanced artificial intelligence computational methods in solid mechanics.

Speech Title (English):

A Data-Driven Machine Learning Approach for Correlating Geological Data in Extraterrestrial Exploration

Speech Abstract
(Please provide in paragraph form within 500 words.)

Abstract:
In-situ measurements of planetary environments, particularly on the Moon and Mars, are essential for advancing extraterrestrial exploration. However, determining the thermomechanical properties of regolith is challenging due to its inherent inhomogeneities. This paper presents a machine learning approach for thermal probing of regolith, utilizing an active hotwire technique to measure in-situ temperature variations and heat flux, which enables accurate prediction of thermophysical properties. Additionally, an enhanced thermal probing system is developed to measure the thermophysical parameters of rock-regolith mixtures on extraterrestrial surfaces, combining transient plane source methods with machine learning for precise inversion. For lunar sampling, a machine learning model is introduced to predict extraterrestrial rock hardness from morphological features extracted from images, using a Meta-Random Forest and Support Vector Regression approach to estimate Mohs hardness with high accuracy. Finally, a data-driven surrogate model is proposed to predict drilling and coring performance on lunar regolith, integrating experimental data with Bayesian neural networks and active learning to optimize coring efficiency. These advancements in thermal probing, rock hardness prediction, and drilling optimization offer innovative solutions for enhancing extraterrestrial exploration.