IAF MICROGRAVITY SCIENCES AND PROCESSES SYMPOSIUM (A2)
Science Results from Ground Based Research (4)

Author: Mr. Szymon Krawczuk
Gdansk University of Technology, Poland

Mr. Daniel Cieslak
Gdansk University of Technology, Poland
Mr. Jan Ignacy Łubiński
Gdansk University of Technology, Poland
Ms. Natalia Askierko
Gdansk University of Technology, Poland
Ms. Julia Sulima
Gdansk University of Technology, Poland
Mr. Jakub Gierowski
Gdansk University of Technology, Poland
Ms. Natalia Peczek
Gdansk University of Technology, Poland
Prof. Jacek Łubiński
Gdansk University of Technology, Poland
Dr. Adam Dabrowski
Astronika, Poland
Prof. Małgorzata Szczerska
Gdansk University of Technology, Poland

PRELIMINARY RESULTS FROM SLUGG - FRICTIONS VS MICGRAVITY AND PRESSURE

Abstract

The "Solid Lubricants in Microgravity" (SLugG) project, a pioneering initiative undertaken by the students of Gdańsk University of Technology, represents a significant leap forward in our understanding of tribological systems under altered gravitational conditions. This research, seamlessly integrated into the esteemed framework of the ESA Academy's Experiments Programme, utilizes the unique environment provided by the ZARM drop towers to delve into the complex interrelations of pressure, gravity, and friction.

Building upon the foundational research conducted by Duan et al. at the Beijing Drop Tower, which hinted at microgravity's profound impact on tribological behavior yet left critical questions unanswered. Our endeavor sought to bridge these gaps through a novel experimental methodology. By employing solid lubricants and a specially designed vibrational tribometer within a custom-engineered vacuum chamber, we embarked on a journey to unravel the nuances of friction in microgravity.

Our rigorous experimental campaign, encompassing nearly a hundred drops within a single week, has not only been a testament to the feasibility of such intricate studies in microgravity but also stands as a beacon for future tribological research. The wealth of data acquired offers unprecedented insights into the behavior of frictional forces in low-gravity environments, potentially revolutionizing our approach to mechanical design and lubrication in space exploration and beyond.

As we meticulously analyze this extensive dataset, our anticipation grows for the moment when we can share our findings with the scientific community. Our forthcoming presentation aims not only to

illuminate the intricate dynamics uncovered by our study but also to engage in a scholarly dialogue with the works of Professor Duan and others. By drawing parallels and highlighting distinctions, we endeavor to foster a deeper understanding of tribological phenomena in microgravity, paving the way for innovative research directions and contributing to the cumulative knowledge in both tribology and space science.

This publication encapsulates the essence of our investigation, heralding a new chapter in the exploration of tribological systems beyond Earth's confines. Through the synthesis of solid lubricant technology and microgravity experimentation, the SLugG project marks a pivotal advancement in our quest to comprehend and harness the forces that govern motion in the cosmos.