



Overview of the hypersonic atmospheric flight KREPE-2

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Abstract

The Kentucky Re-entry Universal Payload System (KRUPS) provides a quick-turnaround, low-cost platform to conduct atmospheric entry experiments. KRUPS is designed to test multiple types of thermal protection systems (TPS) and scientific instrumentation. Five KRUPS capsules were sent to the International Space Station (ISS) via the NG-20 Cygnus resupply vehicle. After the completion of the resupply mission, the Cygnus vehicle de-orbited with the capsules inside. Cygnus then broke up into the atmosphere in order to burn up stored trash. These five capsules constitute the second Kentucky Re-entry Payload Experiment (KREPE-2) mission, each with a different heatshield TPS material. Following on the success of the first KREPE mission, the second generation of capsule design added updated avionics, extended battery life, and more scientific instrumentation. Added instrumentation included an updated flight computer, 5 port flushed air data sensing (FADS) pressure port system, GPS receiver, pre-calibrated IMU, and a spectrometer. In addition to this added instrumentation, the KREPE-2 capsules can transmit back 5 times more scientific data than the first generation KREPE-1 capsules via the Iridium satellite network. This data will help with the reconstruction of the atmospheric entry environment and validation of computational fluid dynamics (CFD) and material response (MR) models developed at the University of Kentucky.

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Fig 1. The five assembled KRUPS capsules of the KREPE-2 flight