

MICROGRAVITY SCIENCES AND PROCESSES (A2)
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DUSTY PLASMA COMPRESSIBILITY FROM AN ANALYSIS OF DUST SHOCK WAVE
PROPAGATION.

Abstract

Dusty plasma takes attention as an example of non-ideal many-particle system, which can be treated as a model of the standard non-ideal thermodynamical systems. A convenient method of the thermodynamical properties researches is the investigation of shock waves propagation in the matter. A compression shock wave propagation in an elongated three-dimensional dusty cloud was observed in the "Plasma Kristall - 4" parabolic flight experiments at the NOVESPACE A300-ZeroG Plane during the the ESA's Parabolic Flight Campaign 49 which took place at Bordeaux from October 28 till November 07 of 2008. 15 parabolas at Day 3 were used for investigation of the initiated solitary waves in an elongated dust cloud. The compression wave was excited by a pulse electric action on the cloud in the direct current discharge with 1 kHz alternating polarity. Using the hydrodynamics approach for analysis of the wave propagation a pressure of dust component was calculated, dusty plasma compressibility derived and Hugoniot adiabat was restored for the dusty plasma matter. This work was supported by DLR under grant 50 WM 0804, by ESA at the 49th parabolic ight campaign, and by Russian Foundation for Basic Research grant No. 09-02-01354.