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Nonlinear dust acoustic waves in a plasma under microgravity conditions. BIN LIU, University of Iowa, JOHN GOREE, Department of Physics and Astronomy, The University of Iowa, Iowa City, Iowa 52242, USA, MIKHAIL PUSTYLNIK, HUBERTUS THOMAS, Institut fr Materialphysik im Weltraum, Deutsches Zentrum fr Luft- und Raumfahrt, Mnchner Str. 20, 82234 Weling, Germany, VLADIMIR FORTOV, ANDREY LIPAEV, ALEXANDER USACHEV, VLADIMIR MOLOTKOV, OLEG PETROV, Joint Institute for High Temperatures of the Russian Academy of Sciences (JIHT RAS), Izhorskaya 13/19, 125412 Moscow, Russia, MARKUS THOMA, I. Physikalisches Institut, Justus-Liebig-Universitt Gieen, Heinrich-Buff-Ring 16, 35392 Gieen, Germany — Nonlinear dust acoustic waves were investigated in a plasma under microgravity conditions, using the European Space Agency facility PK-4 on the International Space Station (ISS). A large three-dimensional cloud of dust particles was confined near a radio-frequency coil that powered a glow discharge in low-pressure neon gas. Low-frequency dust acoustic waves were spontaneously excited, due to the flowing ions in the plasma. The waves were nonlinear, with a large amplitude. Experimental spectra for dust particle motion were obtained, using the particle position data from an analysis of the images of the particle motion. Nonlinear phenomena are discussed, including nonsinusoidal waveform shape and indicator of wave synchronization. All authors acknowledge the joint ESA/Roscosmos "Experiment Plasmakristall-4" onboard the International Space Station. Work was partially supported by DLR Grant Nos. 50WM1441 and 50WM1742. Work at Iowa was supported by NASA-JPL subcontracts 1573629 and 1579454, and the NSF Award No. 1740379.

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