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**Electron-beam dynamics in a cold plasma** TSUYOSHI TAKEDA, Hitachi Kokusai Electric Inc., KEIICHIRO YAMAGIWA, Shizuoka University — There is unexplained plasma behavior, such as particle acceleration and heating, in space plasmas enclosing the earth, whereas linear and nonlinear phenomena have been observed. Thus it is necessary to simulate such plasmas in laboratory experiments. Electron two-stream instabilities, which are easily observed in laboratory and space plasmas, cause nonlinear phenomena because excited waves grow up to large amplitudes. It is very important to investigate nonlinear interaction between waves and particles, which may be related to particle acceleration. In our study, phase-space holes surrounded by electrons self-trapped by electron-beam waves were experimentally observed in a cold plasma. The holes evolved to large scale in electron response time, meanwhile their lifetimes were extremely short. In the case of a denser electron beam, the beam branches expanding to higher velocity were also observed next to the holes, which meant that detrapped electrons were accelerated. We discussed the magnitude of the wave potential and the local source of the acceleration energy.

[1] T. Takeda and K. Yamagiwa, Phys. Lett. A, **339**, 118-122 (2005).

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