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Dust-Density Waves Under Microgravity Conditions and Their Influence on the Discharge[1] TIM BOCKWOLDT, KRISTOFFER MENZEL, ALEXANDER PIEL, Institute for Experimental and Applied Physics, Christian-Albrechts-University Kiel, Germany — In a capacitively-coupled radio-frequency discharge, micrometer sized particles charge negatively and sediment in the lower sheath. Under microgravity conditions, e.g., on parabolic flights, the dust particles fill the whole plasma except for a central void. In these extended clouds dust-density waves are spontaneously excited and propagate radially outwards. Depending on the discharge parameters and the amount of dust injected into the plasma, the wave field exhibits commensurable or incommensurable frequency clusters with commensurate or incommensurate frequencies. Incommensurable frequencies were found in situations with spatial gradients of the dust plasma frequency [1]. When clusters of commensurable frequencies, e.g., harmonics of a fundamental, are formed, a simultaneous modulation of the plasma glow can be observed [2]. Measurements of the discharge voltage and probe signals show, that the entire discharge is affected. We therefore suggest the model of a self-organized system including the discharge, the dust particles and the electric circuit. In this contribution the findings and the model will be discussed in detail.

[1] Menzel, K.O., Arp, O., Piel A., Vol 104, p. 235002, 2010
[2] Bockwoldt, T., Menzel, K.O., Arp, O., Piel, A.,IEEE Trans. Plasma Sci., Vol 41, 4, 2013

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