

## **Non-quasi-neutral Plasmas and Current Double-layers**

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Chasmas, i.e. non-quasi-neutral plasmas, are a generalization of plasmas, i.e. the condition of quasi-neutrality is dropped. This means that in chasmas the quasi-neutrality may be (strongly) violated over distances many times the Debye length which requires special circumstances (double layers, electric fields, ...).

When the solar wind hits the magnetosphere of the Earth a kind of charge separation occurs resulting in a huge double layer current

flowing over the magnetosphere towards the polar regions. This may even affect the dynamo in the Earth and the length of the day.

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1. Callebaut, D. K., Karugila, G. K. and Khater, A. H., 2005: "*Chasma perturbations*", Proc. PIERS 2005, August 22-26, Hangzhou, China, 720-723.
  2. Callebaut, D. K. and Khater, A. H., 2006: "*Chasma including magnetic effects*", Proc. PIERS 2006, March 26-29, Cambridge, USA, 404-411.
  3. Callebaut, D. K. and Kikuchi, H., 2007: "*Debye shielding in chasmas*". Proc. PIERS, 2007, 27-30 August, Prague.
  4. Callebaut, D. K. and Kikuchi, H., 2008: "*Extending the concept of Debye length for chasmas*". Proc. PIERS, 2008, 24-28 March, Hangzhou, China.
  5. Callebaut, D. K., 2008: "*Generalization of Debye Length for Chasmas with Different Electron and Ion Temperature*" in Proc. AIS-2008, Kaliningrad, Russia, 12-16.
  6. Callebaut, D. K., 2008: "*Chasma Instabilities Including Magnetic Fields*", in International Journal Unconventional Electromagnetics and Plasmas, GRP, New Delhi, India, Vol. 1 (1-2), 31-36.