Geophysical Research Abstracts,
Vol. 10, EGU2008-A-11575, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-11575
EGU General Assembly 2008

Signatures of substorm triggering in the magnetotail during IMF

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The dynamics of the magnetotail is analyzed with the help of three dimensional self consistent global PIC simulations as the interplanetary magnetic field (IMF) rotates progressively from northward to southward direction. Two successive temporal phases can be identified for the dynamics of the inner magnetosphere, as IMF rotates respectively North to Dawn dusk(DD) and Dawn Dusk to South. This dynamics reveals to be quite different within meridian/equatorial planes with a certain time delay. This can be used as an temporal index for identifying different "signatures" before and during a substorm triggering. Expected signatures such as (i) magnetic pile up, (ii) current disruption (in the nearby tail region), (iii) a drastic transition dipolar-tail B field in the nearby-tail, (iv) formation of X-point reconnection region both in nearby tail and at the subsolar point are evidenced. Present results show that signatures related to substorm onset take place successively and mainly during the second half of the IMF rotation (DD to South).