Meiji University Global COE Program

46th Mathematical Sciences based on Modeling, Analysis and Simulation seminar

Date: October 27, 2011, 16:30～18:00

Location: Meiji Univ. Ikuta Campus, Build 2 Annex A, Room A305

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Title : Detection of the substorm precursor from ground-magnetometer data.

Abstract : Auroral substorm is one of the energy release process of solar wind stored Earth's magnetosphere. It has been reported that huge auroral substorm sometimes cause a massive power outrage. It is not peculiar to auroral substorm but all geophysical phenomena that occur suddenly could be threats for human activity. Hence, it is important to detect precursory events in terms of the imminent prediction. In the field of Solar- Terrestrial Physics, it is widely recognized that the occurrence of auroral substorm could be detectable as an increase in the northward component of the Earth's magnetic filed observed at mid and low latitudes. However, since their initial movement is quite gradual, it is difficult to detect them. Recently, *Tokunaga et al.* (2010) introduced the Change-Point detection method, called Singular Spectrum Transformation (SST), to detect the precursor of auroral substorms from ground-magnetometer data. SST is a powerful method to detect gradual, minute signals from real world time series data. In this seminar, firstly, I define the problem setting of real world precursory detections and consider its difficulties. Second, the basic concept of SST is introduced. Third, we apply SST to geomagnetic time series data.

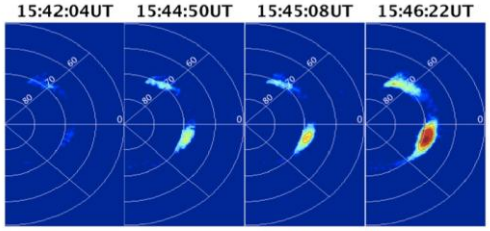

Fig.1 A substorm onset observed at Polar satellite.

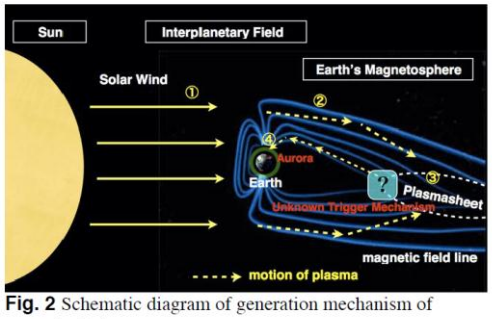

Fig. 2 Schematic diagram of generation mechanism of auroral substorms.

Everyone is welcome to attend the MAS seminar.

Meiji institute for Advanced Study of Mathematical Science (http://www.mims.meiji.ac.jp)

(Organizers: M. Mimura, D. Ueyama, Y. Wakano, K. Ikeda and S.Kinoshita)

MAS seminar is partly supported by Meiji University Global COE program "Formation and Development of Mathematical Sciences Based on Modeling and Analysis" (http://gcoe.mims.meiji.ac.jp/), the Grant-in-Aid for Scientific Research (S), "Mathematical Theory of Nonlinear-Non-equilibrium Reaction-Diffusion Systems" by M. Mimura (http://nnrds.math.meiji.ac.jp/).

Access: 10 minutes on foot from Ikuta St. Odakyu line,
Or 10 minutes by bus No. 13「明治大学正門前」, get off at the last stop.
See http://www.meiji.ac.jp/koho/campus_guide/ for details.