NINETEENTH FUSION ENERGY CONFERENCE

SESSION TH/2

Wednesday, 16 October 2002, at 14:00

Chair: W.M. NEVINS (USA)

SESSION TH/2: Non-Diffusive and Other Transport Phenomena

Paper IAEA-CN94/TH/2-1 (presented by X. Garbet)

Discussion

F. Porcelli: Why do you exclude the possibility that a magnetic island with a width comparable with the distance between the two internal barriers is causing the temperature gradient to be reduced within the island and increased on the two sides just outside the island, i.e. in correspondence with the apparent location of the two barriers?

X. Garbet: The steepening of the temperature profile on the edge of the island would probably not be large enough to explain the double barrier that is observed. This is why we rather favor an explanation based on the rotational shear that appears close to the island.

F.W. Perkins: Your presentation emphasized the importance of magnetic shear and also presented four models. If you had to predict the occurrence of an ITB, which model would you use?

X. Garbet: These models are probably not accurate enough to predict an ITB in a next step device. As an intermediate step, we will use them in a predictive way when preparing future high power experiments in JET.

Paper IAEA-CN94/TH/2-2 (presented by V. Tangri)

Discussion

R.E. Waltz: Avalanches in simulations are observed to propagate both inward and outward. Can your models predict the direction and on what does it depend?

V. Tangri: Our model has been tested with arbitrary placement of the heat source. The temperature front propagates inward as well as outward depending on the local temperature gradient.

Paper IAEA-CN94/TH/2-4 (presented by E.J. Kim)

Discussion

D.F. Escande: What is the reason (experimental or numerical) to choose a solution with a given shape multiplied by a time-dependent amplitude?

E.J. Kim: It is because there are situations where burst time is short compared with natural evolution time of structure, in which case separability of time-dependent amplitude is OK. It is rather like “sudden approximation” in quantum mechanics (i.e. rather the exact opposite of adiabaticity). In general, the time dependence may be more complicated.

F.W. Perkins: You proposed a realization of instantons in terms of a system of partial differential equations. Do you have experience in the type of coherent structures that can develop?

E.J. Kim: There may be monopole solutions for electric potential while pressure is a function of potential. The point is, however, that instanton calculus is general and can be applied to any exact nonlinear solution.

Paper IAEA-CN94/TH/2-5 (presented by V.P. Pastukhov)

Discussion

M. Becoulet: Experimentally we see the fast relaxation of the pressure profile due to MHD instabilities, but in your calculations the pressure profile is always marginally stable during 2D MHD convection. How do you explain that? I mean events like ELMs, kink instability, etc.

V.P. Pastukhov: In my paper I discussed the plasma convection driven by the flute-like MHD mode near the marginally stable state in a levitated dipole configuration. When beta is below the critical value, all other MHD modes (including large-scale kinks) in this system are stable due to the presence of a hard core. FRC experiments with suppressed kinks also demonstrate the existence of marginally stable profiles.

Paper IAEA-CN94/TH/2-6 (presented by K.C. Shaing)

Discussion

E. Joffrin: How does the bifurcation process depend on the poloidal number of the island?

K.C. Shaing: We have not done such a parameter scan yet.