Asociación Argentina
de Mecánica Computacional

Mecánica Computacional Vol XXXVIII, págs. 943-943 (resumen)
H.G. Castro, J.L. Mroginski, R.R. Paz, M.A. Storti (Eds.)
Resistencia, 1-5 Noviembre 2021

STUDYING THE CORONAL HEATING PROBLEM USING NUMERICAL SIMULATIONS

Laura F. Morales

Instituto de Física del Plasma (UBA/CONICET), Dpt. de Física, FACENA-UBA

Abstract. The Sun is a typical magnetic star our galaxy with a surface temperature of 5000 K. The Sun's atmosphere is extremely hot (1e6 to 1e7 K) and is composed of a thin, highly magnetized and stratified plasma. The outermost layer of the solar atmosphere is the corona. A great variety of transient phenomena take place there. One of these phenomena are solar flares or flares. When they occur, the coronal plasma is heated locally to temperatures of the order of 1e7 K in extremely short times. In 1988 Parker suggested that the mechanism magnetic reconnection is the mechanism that dominates the release of energy. The coronal magnetic fields anchored in the turbulent photospheric plasma suffer strong deformations forming complex sheets of currents. When the intensity of the current increases beyond a certain threshold, the magnetic reconnection phenomenon dominates (locally) the coronal dynamics and the magnetic energy is released in the form of kinetic energy and thermal energy (Parker, 1988 Parker, 1983). Two alternative approaches have been developed in order to evaluate the predictive capacity of Parker's model: the first assumes that the coronal plasma is a magnetic fluid that can be described by the equations of magnetohydrodynamics, and in the second the hypothesis is that the solar corona is in a state of self-organized criticality and the dynamics of the coronal magnetic field can be modeled through a cellular automaton. In this work, we will present both approaches and discuss their strengths and weaknesses with particular interest the prediction of solar flares and their impact on space weather.