

The dynamics of non-linear ionospheric rf wave processes

A. Mary Selvam

Indian Institute of Tropical Meteorology, Pune 411 008, India

Email: amselvam@eth.net

Web sites: <http://amselvam.tripod.com/index.html>

<http://www.geocities.com/~amselvam>

AIP Conference Proceedings Vol 159(1) pp. 460-463. September 1987 http://content.aip.org/APCPCS/v159/i1/460_1.html

Abstract

High power narrow band rf pulses used in ionospheric heating experiments undergo spectral broadening in the ionosphere. In this paper it is shown that the universal period doubling route to chaos is the mechanism by which the incident rf pump energy generates larger eddies in the ionospheric plasma analogous to triggering of chaos in a non-linear optical medium by a laser energy pump. In summary, the physics of the universal period doubling route to chaos implies growth of self similar large eddy continuum circulations from space time integrated mean of inherent smaller scale perturbations at incremental length steps equal to the turbulence scale length. The ionosphere-troposphere coupling mechanism which can possibly trigger inadvertant weather/climate change by the ionospheric heating experiments is discussed.

Key words: IONOSPHERE, WAVE PROPAGATION, RADIOWAVE RADIATION, PULSES, POWER, PLASMA HEATING, CHAOTIC SYSTEMS, NONLINEAR PROBLEMS