Features of the NC_{th} in SEE spectra

V.L. Frolov, D.I. Nedzvetski, and E.N. Sergeev

Radiophysical Research Institute (NIRFI), Nizhni Novgorod, Russia

vf@nirfi.sci-nnov.ru / Phone: 007-8321-32 57 83

Basing on experiments carried out at the Sura heating facility, it has been elaborated an empirical model for generation of the thermal narrow continuum (NC_{th}) in stimulated electromagnetic emission (SEE) spectra, which is observed in the lower sideband of the pump wave (PW) frequency extending up to the down-shifted maximum (DM) and the spectral intensity of which decreases exponentially with the increase of frequency shift from the pump.

The generation of NC_{th}, as well as DM and broad continuum (BC), occurs due to excitation of the thermal (resonance) parametric instability (TPI). Integral intensity of the NC_{th} is close to or even higher than DM integral intensity. The basic characteristics of the NC_{th} are very similar to analogous DM ones. Among them are: magnitudes of their thresholds; strong influence of HF-induced striations on their features; dependences of their intensity on PW frequency, PW power, and heating antenna beam position relatively to the geomagnetic field; gyro features; typical times of their development after PW switch-on; generation of these SEE components when a PW frequency is slightly below of F_2-region critical frequency (f_{0F2}) but an upper hybrid resonance frequency for the PW still remains below f_{0F2}. The intensity of the NC_{th}, as for DM, has a maximal level in a PW frequency range from 5 to 7 MHz and it is fast reduced outside of this range. The form of NC_{th} spectra is often very similar to the spectral form of DM and its satellites (DM1 and DM2) for their low frequency flanks. When a PW frequency is very close to a gyroharmonic frequency and suppression of TPI and SEE thermal components (DM, BC, and NC_{th}) are observed, in a frequency range below a PW frequency it is registered the ponderomotive NC (NC_p).

The generation of the NC_{th} may be interpreted through the following processes: a) scattering of O-mode PW into primary upper hybrid waves from HF-induced striations; b) decay of the primary upper hybrid waves into secondary upper hybrid waves through cascading process; c) re-conversion of the secondary upper hybrid waves into electromagnetic waves (SEE) by their scattering from the striations.