

A REPORT ON CURRENT RESEARCH REGARDING THE
METEOR TRAIL ECHO AND HYPER-SPEED METEOR
EVENTS USING THE ARECIBO 430 MHZ RADAR

Wen, C.-H., Doherty, J. F., Mathews, J. D.²

Communications and Space Sciences Laboratory,, The Pennsylvania
State University,, University Park, PA 16802-2707, USA

The meteor return signature (MRS) and the filterbank algorithms for meteor detection (C.-H. Wen et al., Geoscience and Remote Sensing, IEEE Trans., 42, 501-510, 2004) are used for the usual meteor searching process as applied to Arecibo 430 MHz meteor observation data. This approach is used to automatically find and process thousands of meteor events. Currently we use (in slightly modified form) the same algorithms to search for the meteor trail-echo and to search for the hyper-speed (≈ 72 km/sec) meteor events. We use the filterbank algorithm to estimate the Doppler frequency (velocity) and the altitude of each meteor event. For some meteor events we have found significant power at low Doppler frequency (near DC) that correlates with the altitude of the head-echo event. This result suggests that the Arecibo 430 MHz radar can detect the meteor trail-echo in some cases thus suggesting additional clues as to the meteor processes. Observational trail-echo results will be shown in this paper.

We also modified the meteor search algorithm for enhanced sensitivity to short (one or two radar pulse returns only) hyper-speed meteor events. In this algorithm we combine two inter-pulse period (IPP) signals together on a FIFO basis and find the Doppler spectrum. If a meteor event is present in both IPPs, there is a corresponding signature in the frequency spectrum. We then apply the MRS correlator and set a threshold (determined by the noise level) to detect the presence of an event signature. Observational results analyzed in this manner suggests the existence of hyper speed meteoroids. We give examples.

Abstract Submission Form
2004 National Radio Science
Meeting

Abstract: wen24613

Date Received: September 24, 2004

1. (a)
Chun-Hsien Wen
Communications and Space Sciences
University Park, PA
16802 USA
cxw381@psu.edu
(b) (814)865-2354
(c) (814) 863-8457
2. H - Waves in Plasma
3. (a)
4. C - Contributed Paper,
Program chair: Sigrid Close,
Diego Janches
5. No special instructions