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# Angular Beaming Characteristics of Auroral Kilometric Radiation Attributed to Cyclotron Maser Mechanism

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Earth's Auroral Kilometric Radiation (AKR), whose sources are confined in density cavity along the auroral field line, has been observed from spacecraft in the frequency range from 50 to 700 kHz with right-hand and left-hand polarization. From the theoretical point of view, it is widely accepted that the cyclotron maser instability (CMI) plays a role in generating primary in the right-hand extraordinary (R-X) mode of AKR. Previous studies suggested that the beam structure of AKR corresponds filled or hollow cones along magnetic field, but the tangent plane beaming model proposed by Mutel et al. [2008] is the most plausible candidate. In this model, the emissions are confined to a plane tangent to the source local magnetic latitude but refracted upward. More recent work by Menietti et al. [2011] extends this model to the source region as a thin sheet of elementary "sourcelets" using ray tracing technique, in agreement with AKR observations. In terms of numerical simulation, we have used a 2-1/2D electromagnetic electron hybrid code in which we consider the cold electrons to be a fluid, the hot electrons to be finite-size relativistic particles, and the ions to be a charge-neutralizing stationary component. Such velocity distributions as loss-cone, ring-shell and horseshoe, are assumed in the center of the simulation region, while denser cold plasma surrounds this region whose right and left boundaries are terminated by wave absorption regions. This vertical region, in which periodic boundary conditions are assumed, is along Earth magnetic field. We will report the result of this computation concerning the beam structure of AKR as well as the generation process.

Mutel, R. L., I. W. Christopher, and J. S. Pickett (2008), Cluster multispacecraft determination of AKR angular beaming, Geophys. Res. Lett., 35, L07104, doi:10.1029/ 2008GL033377.

Menietti, J. D., R. L. Mutel, I. W. Christopher, K. A. Hutchinson, and J. B. Sigwarth (2011), Simultaneous radio and optical observations of auroral structures: Implications for AKR beaming, J. Geophys. Res., 116, A12219, doi:10.1029/2011JA017168.

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