Modelling the generation conditions of magnetospheric Pc1 emissions

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According to the bouncing-wave model for generation of magnetospheric Pc1 emissions, the generation is possible if the total two-hop gain of an ion-cyclotron wave (ICW), taking into account possible losses, exceeds unity. In this report, we study the behavior of the total ICW gain comprising the cyclotron amplification Γ near the equatorial plane due to resonant wave-particle interactions and losses due to the wave reflection from conjugate ionospheres. We calculate the total gain $G=R_N R_S \Gamma^2$ for different local times and seasons at different latitudes. The reflection coefficients in the northern and southern hemispheres, R_N and R_S, respectively, are calculated using the IRI ionospheric model. For calculations of the Alfven wave amplification Γ, the recently published equatorial cold plasma density model is used. To select the favorable conditions for the ICW generation, we apply the constraint $G>1$. Using this constraint, the generation frequencies as well as the regions of most probable generation in MLT-CGLat coordinates are found. Their seasonal dependence is also considered. We compare the model predictions with known features of the Pc1 pulsations and discuss their similarities and differences.

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