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Efficiency of electron cyclotron acceleration by whistler-mode wave packets with varying frequency and amplitude

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We present some results of numerical modeling of the gyroresonant acceleration of radiation-belt electrons by quasimonochromatic whistler-mode waves with varying frequency, such as chorus wave packets. In particular, we study the influence of amplitude modulation typical for chorus elements on the efficiency of wave-particle energy exchange. The time scale of such a modulation is of the order of the period of nonlinear oscillations of trapped particles in the wave field. If the modulation depth is 50%, then the maximum energy gain of a single particle as well as the number of particles accelerated in the regime of trapping by the wave field decrease by about a factor of two. As the modulation depth is increased further, the maximum energy gain remains roughly the same and can reach several tens of keV for the outer radiation belt conditions and for a wave frequency increase by 15%. However, the number of trapped and accelerated particles decreases quickly, i.e., by almost two orders of magnitude for the modulation depth of 100%. Thus, the role of particles trapped by a wave in the total energy balance of wave-particle interaction can become comparable to or less than the contribution of the particles accelerated in the stochastic regime.