S001-P12
ポスター 3 ：11/6　AM1/AM2 （9:00-12:30）

円偏波プラズマ波動による荷電粒子捕捉に関する統一モデル

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A comprehensive model of the particle-trapping in a circularly polarized plasma wave

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Wave-particle interactions play a crucial role in the plasma dynamics such as particle acceleration, pitch angle scattering, and wave growth in space plasmas. For quantitative evaluation of the effectiveness of wave-particle interactions, we should estimate the size of a trapping region of charged particles encountering plasma waves. The trapping region in wave-particle interaction is expressed as a set of closed trajectories in the phase space and involves conserved quantities. By applying the method used in Albert et al. (2021) to the two conserved quantities introduced by Berchem and Gendrin (1985), we classified the motion of non-relativistic electrons on the wave-particle interaction and constructed a new model that can specify the exact trapping regions in the velocity space. This model predicts that the normal trapping region of the conventional cyclotron resonance seamlessly connects with the trapping region of the non-resonant interactions at the low pitch angle region. The trapping region predicted by our model corresponds to that of the conventional single pendulum model asymptotically at a high pitch angle region. We also found that this model is a general form that includes other models developed in previous studies, such as the two-valley motion model and efficient trapping at low pitch angles. Additionally, this model predicts the existence of a new trapping region in the velocity space in the direction opposite to the resonance velocity. We calculated the trapping regions by using our model with the parameters of lion roar in the magnetosheath, and we found that lower wave frequencies and larger wave amplitudes tend to yield larger trapping regions at low pitch angles. This new model for the exact trapping regions is expected to be applied to observation data of various wave-particle interactions on the cyclotron resonance.