

# An new approach to the process of the magnetosphere-ionosphere coupling in global MHD simulations

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We describe a new process of the magnetosphere-ionosphere coupling for global MHD simulations. In global MHD simulations, field-aligned currents and electric potentials interact each other in the region between the ionosphere and the inner boundary of the magnetosphere. In order to determine these field-aligned currents and the electric potentials self-consistently, we consider the boundary condition as the problem of wave reflection, assuming that the field-aligned currents are associated with the shear Alfvén waves. Separating the perturbed components from the correct solutions, the equation of current continuity of these components is considered. Then we determine the perturbed components generated by the magnetosphere-ionosphere coupling. Since the perturbed components of the electric potentials are regarded as inductive, the new process is applicable to the general problems of the magnetosphere-ionosphere coupling.