One-sided duct propagation analysis by ray tracing

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It has been reported that whistler mode waves can propagate to counter hemisphere along the inner edge of the plasmapause and the trough. But, it is not always clarified the propagation mechanisms. In this report, we will study to make clear them by using the equations representing the change rate of the wave normal directions due to the inhomogeneity of plasma density and configuration of geomagnetic field. Consequently, it is found that the density gradient of the inner edge of plasmapause bend the wave normal direction equatorward, the magnetic field gradient deflects the ray poleward.