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Waves and instabilities near the plasmapause

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In this paper we investigate wave and instability structures on the Earth's plasmapause using magnetic, electric and particle data from the THEMIS satellites. We automatically determine the location of the plasmapause by fitting a suitable function to the spacecraft potential and identifying the position of a sudden change due to the higher particle density inside the plasmasphere. We investigate theoretically under which conditions one might expect waves due to the Kelvin-Helmholtz instability occurring at the plasmapause, including their growth rate, frequency and scale size (wavelength). We present some cases under favorable magnetospheric conditions during which the THEMIS satellites possibly observed wave structures due to a flow shear near the plasmapause, investigate their temporal and spatial characteristic lengths, and compare the observations to our theoretical predictions. We tentatively conclude that the Kelvin-Helmholtz instability can occur near the interface between plasmasphere and magnetosphere and investigate possible connections to plasmaspheric sub-corotation.