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Flute instability in the divertor plasma D.D. RYUTOV, R.H. COHEN, Lawrence Livermore National Laboratory, Livermore, CA 94551 — An analysis of the flute instability in the realistic geometry of an X-point divertor is provided, for both common and private flux regions. The drive includes curvature and the electron temperature gradient, combined with the sheath boundary condition at the divertor plates. The effects of X-point shearing, that have been in the past described in a semi-phenomenological manner, are included based on first principles. The curvature drive is shown to be significant for both inner and outer divertor legs, contrary to the slab analysis. Characteristic signatures of the ensuing instabilities (typical frequencies, wave-numbers, correlation between the density and potential perturbations) are presented. The effects of the sheath boundary conditions on the instabilities are explicitly displayed. The results can be used for the interpretation of experiments and for code benchmarking. Work performed for US DOE by UC LLNL under contract No. W-7405-Eng-48.

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