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Numerical and Analytical Calculation of Bernstein Mode Resonances in a Non-Uniform Cylindrical Plasma[1] DANIEL K. WALSH, DANIEL H.E. DUBIN, University of California San Diego — This poster presents theory and numerical calculations of electrostatic Bernstein modes in an inhomogeneous cylindrical plasma column. These modes rely on FLR effects to propagate radially across the column until they are reflected when their frequency matches the local upper hybrid frequency, setting up an internal normal mode on the column, and also mode-coupling to the electrostatic surface cyclotron wave (which allows the normal mode to be excited and observed using external electrodes). Numerical results predicting the mode spectra, using a novel linear Vlasov code on a cylindrical grid, will be presented and compared to an analytic WKB theory. A previous version of the theory[2] expanded the plasma response in powers of 1/B, approximating the local upper hybrid frequency, and consequently its frequency predictions are shifted with respect to the numerical results. A new version of the WKB theory uses the exact cold fluid plasma response and does a better job of reproducing the numerical frequency spectrum. The eventual goal is to compare the theory to recent experiments that have observed these waves in pure electron and pure ion plasmas.[3]

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[2]D.Dubin, Phys.Plasmas. **20**, 042120, 2013.
[3]M. Affolter *et. al.*, Phys. Plasmas**22**, 055701, 2015.

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