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Modelling of the HSX Reflectometer and Planned Doppler Reflectometer with the Ray-Tracing Code TRAVIS

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A density fluctuation and profile reflectometer diagnostic is in place on the Helically Symmetric Experiment (HSX). It is currently installed as a perpendicular incidence reflectometer with a shared launching and receiving antenna. Probing microwaves range from 14.5-25 GHz, and either O or X-mode propagation can be selected. Preliminary modelling of this reflectometer with the ray-tracing code TRAVIS is discussed here. Specifically, analysis of beam width and wavenumber resolution of the existing perpendicularly-oriented reflectometer for both O and X-mode propagation and an assortment of cutoff layers and magnetic configurations is presented. Plans for modifying the existing reflectometer to allow for Doppler reflectometry are underway. Modelling of this planned Doppler reflectometer for HSX is shown, including predictions for perpendicular wavenumber sensitivity and resolution for a range of launching/receiving mirror angles and cutoff layers.

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