Coupling an ICRF core spectral solver to an edge FEM code
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The finite element method (FEM) and the spectral approaches to simulation of ion
cyclotron (IC) waves in toroidal plasmas each have strengths and weaknesses. For
example, the spectral approach (eg TORIC) has a natural algebraic representation of
the parallel wavenumber and hence the wave dispersion but does not easily represent
complex geometries outside the last closed flux surface, whereas the FEM approach
(eg LHEAF) naturally represents arbitrary geometries but does not easily represent
thermal corrections to the plasma dispersion. The two domains: thermal core with
flux surfaces and cold edge plasma with open field lines may be combined in such a
way that each approach is used where it works naturally. Among the possible ways
of doing this, we demonstrate the method of mode matching. This method provides
an easy way of combining the two linear systems without significant modifications to
the separate codes. We will present proof of principal cases and initial applications
to minority heating.