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Higher order vector edge finite element analysis of optical waveguides

We will present some applications of vector edge finite element methods to the analysis of optical fiber such as the computation of the propagation constant and propagation mode and that of the birefringence. To address the need for a more accurate finite element approximation we develop a higher order vector edge finite element model. It is well known that the use of standard nodal finite element methods does not work well for electromagnetic problems. Although edge elements appear to be reliable, some care must be taken in order to avoid spurious modes. We will discuss some observations and mathematical properties which ensure that the higher order vector finite element converges and is free of spurious modes.