A Novel finite element discretization of domains with spherical geometry

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We develop and analyze finite element discretizations for domains with spherical geometry. In particular, we describe the method used to approximate solutions (as well as eigenvalues and eigenvectors) of partial differential equations posed on the sphere, ellipsoidal shell, and cylindrical shell. These novel, so-called, "radially projected finite elements" are particularly attractive for numerical simulations since the resulting finite element discretization is "logically rectangular" and may be easily implemented in existing finite element codes.