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Strong curvature effects in wave problems MORTEN WILLATZEN, Technical University of Denmark, Kgs. Lyngby, Denmark, ANDERS PORS, University of Southern Denmark, Snderborg, Denmark, JENS GRAVESEN, Technical University of Denmark, Kgs. Lyngby, Denmark — Linear-in-curvature contributions to wave-problem eigenvalues in quantum mechanics and acoustics are evaluated analytically using differential geometry methods and perturbation theory. It is demonstrated that in the case of Neumann boundary conditions, relevant for electromagnetic and acoustic problems, linear-in-curvature contributions are nonvanishing if the geometry supports eigenstates that do not satisfy parity. If Dirichlet boundary conditions apply, however, linear-in-curvature vanish identically. We continue to compute analytically eigenvalue changes for a toroidal angular-sector geometry in the case of both Dirichlet and Neumann boundary conditions. Eigenstate and eigenvalue results are finally verified qualitatively and quantitatively against Comsol finite element model results.

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