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A SIMPLE AND ACCURATE DISCONTINUOUS GALERKIN SCHEME FOR ACOUSTIC WAVE EQUATIONS WITH CURVED GEOMETRIES

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Consider solving acoustic wave equations with presence of curved boundary or interfaces. The conventional high-order discontinuous Galerkin scheme on straight-sided elements suffers from second order errors due to piece-wise segment approximation to the curve. We propose a simple flux correction to reduce the errors by projecting quadrature points for line integration onto curved interfaces, and evaluating numerical fluxes at projection points. For curved interfaces, numerical tests demonstrate that this simple modification may reduce interface error and nonphysical diffractions. For curved boundary conditions, with the assumption that the exact solution can be smoothly extended, the local truncation error of the modified DG scheme is high order. Accuracy tests will be shown to demonstrate the effectiveness of this simple correction.