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Progress in the development of explicit Algebraic passive Scalar Flux Model (ASFM) for compressible flows MONA KARIMI, SHARATH GIRIMAJI, Aerospace Engg., Texas A&M University, TURBULENCE RESEARCH GROUP TEAM — Closure modeling of turbulent scalar flux represents an important field of active research in turbulent combustion. Invoking the weak-equilibrium limit of turbulence, the evolution equation for the scalar flux is simplified. Utilizing Representation theory, the resulting algebraic equation is solved for normalized scalar flux. The novelty of the work lies in the extension of this procedure to compressible flows, employing the pressure-scalar gradient correlation that is valid for a wide range of Gradient Mach numbers: (i) the incompressible model of the pressure-scalar gradient is retained at low Mach numbers, (ii) the pressure effects are take to be negligible compared to inertial term at very large Mach numbers, and (iii) the action of pressure is assumed to nullify the inertial effects at intermediate Mach numbers. It is demonstrated that the eddy diffusivity depends, not just on the mean scalar gradient, but also on the anisotropy of the velocity field. The dependence of eddy diffusivity on strain-rate, rotation-rate, and time scale ratio at different Gradient Mach numbers is examined. Additionally, simulations employing the model will be presented.

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