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Rapid distortion analysis of compressible turbulence in ideal gas: Part 2 - Density averaged moments SAWAN SUMAN, HUIDAN YU, SHARATH GIRIMAJI, TUCKER LAVIN, Aerospace Engineering Department, Texas A&M University, College Station, TX 77843-3141 — We perform rapid distortion analysis of linearized, inviscid Favre-averaged Navier Stokes equation. This study - Favre-averaged Rapid Distortion Theory (F-RDT)- investigates the evolution of density weighted fluctuating moments. The fluid is assumed to be an ideal gas. The F-RDT formulation comprises of a closed set of 65 ordinary differential equations for the case of homogenous mean shear field. With $S\Big/R\widetilde{T}$ as compressibility parameter (S =magnitude of mean shear, R =gas constant, $\widetilde{\mathrm{T}}$ =density weighted mean temperature), the versatility of the formulation is demonstrated by recovering both the incompressible and Burgers limit behaviors. Results for several intermediate cases-between the above two extreme limits-are also obtained. Favre-averaged Reynolds stresses, temperature variance, density variance and various cross-correlations will be discussed.

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