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Effects of Mach number and compressibility on vorticity and strain-rate turbulence dynamics SAWAN SUMAN, SHARATH GIRIMAJI, Texas A&M University — We study the effects of Mach number and compressibility on strain-rate and vorticity dynamics in decaying isotropic turbulence employing direct numerical simulations. Since local Mach number and dilatation are two direct indicators of compressibility of a fluid element, we use these quantities as conditioning parameters to examine the various aspects of turbulence dynamics. Several interesting observations along with the underlying physics pertaining to the inertial (vortex stretching and self-straining) and pressure (pressure Hessian and baroclinic) terms in the budget of strain-rate and vorticity dynamics will be presented in the talk. The contrasting nature of these physical effects in expanding vs. contracting and supersonic vs. subsonic fluid elements will be highlighted.

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