Abstract Submitted
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Discrete kinetic energy conservation for variable-density flows on staggered grids[1] RANDALL MCDERMOTT, NIST — It is now conventional wisdom that "kinetic-energy (KE)-conserving" numerical methods are to be preferred for use in large-eddy simulation due to accuracy and stability considerations. For constant-density flows, KE-conserving schemes generally require central differencing and it is common practice to simply apply the same central differencing schemes to variable-density flows without the same rigorous stability guarantees. The theory for semi-discrete KE conservation for constant-density flows is worked out by [Morinishi et al., *J. Comp. Phys.*, 1998]. The requirement of centered time advancement is shown by [Ham et al., *J. Comp. Phys.*, 2002]. As a work-in-progress toward development of a fully conservative scheme for variable-density flows, we extend the Morinishi/Ham analysis for Cartesian staggered grids to include variable density and show that KE conservation requires discrete conservation of mass within each of the staggered momentum cells. This may allow the design of fully conservative schemes for variable-density flows.

[1]This research was performed while the author held a National Research Council Research Associateship at the National Institute of Standards and Technology

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