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Numerical model for atmospheric contaminant cloud rise scenarios YULIYA KANARSKA, ILYA LOMOV, TARABAY ANTOUN, LEWIS GLENN, Lawrence Livermore National Laboratory — Our numerical approach includes fluid mechanical model which is the combination of a compressible GEODYN code and a Low Mach code (LMC). The first one is an explicit code and it is intended to simulate early stages of nuclear explosions up to 15 s. The second one is an implicit code based on a pressure projection method and it is intended to simulate subsequent cloud rise events up to few hours. We perform series of cloud rise scenarios ranging from idealized bubble rise problem to realistic air bursts. We analyze effects of compressible dynamics and different turbulent parameterizations on the cloud evolution. It is found that in a realistic configuration interaction of a reflected shock wave from the ground with a fireball affects significantly cloud evolution in contrast to idealized bubble rise simulations. We show that by providing initial source from compressible GEODYN code, later times flow evolution can be successfully simulated with fast and efficient LMC code. Finally, we develop formalism for tracer particles and their fallout and present some preliminary results.

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