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Development of a scalable high-order conservative nonhydrostatic model by using multi-moment finite volume method

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In this lecture we will present a novel scalable high-order conservative nonhydrostatic multi-moment finite volume dynamical core. The new dynamical core is based on so-called multi-moment constrained finite volume (MCV) method, which is well-balanced among solution quality (accuracy and robustness), algorithmic simplicity, computational efficiency and flexibility for model configuration. Rigorous numerical conservation is guaranteed by a constraint of finite volume formulation in flux form. The resulting MCV models have been verified with widely used benchmark tests. The numerical results show that the present MCV models have solution quality competitive to other exiting high order models. Parallelization of the MCV shallow water model on cubed sphere grid reveals its suitability for large scale parallel processing with desirable scalability

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