

Leonard, B. P.

Comparison of truncation error of finite-difference and finite-volume formulations of convection terms. (English) [Zbl 0798.76053](#)

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Summary: This paper explains significant differences in spatial truncation error between formulations of convection involving a finite-difference approximation of the first derivative, on the one hand, and a finite-volume model of flux differences across a control volume cell on the other. The difference between the two formulations involves a second- order truncation error term (proportional to the third derivative of the convected variable). Hence, for example, a third- (or higher) order finite-difference approximation for the first-derivative convection term is only second-order accurate when written in conservative control volume form as a finite-volume formulation, and vice versa.

MSC:

[76M20](#) Finite difference methods applied to problems in fluid mechanics

[76M25](#) Other numerical methods (fluid mechanics) (MSC2010)

[76R99](#) Diffusion and convection

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Keywords:

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References:

[1] Leonard, B.P., *Comp. methods appl. mech. eng.*, 19, 59, (1979)

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