
Delyan Kalchev
**Accuracy of Least Squares Finite Element Methods for
Hyperbolic Conservation Laws**

1300 30th St
Apt B2-18
Boulder
CO 80303
delyank@gmail.com
Christopher Leibs
Thomas Manteuffel
Steffen Mnzenmaier

Little is currently known about the nature of the numerical error in least squares approximations of conservation laws. In particular, we are interested in how accurately the dispersive properties of the continuous equations are represented. Excessive error in dispersion relations, introduced by the numerical approximation, leads to incorrect wave propagation speeds. This may result in phase error, possible spurious oscillations of non-physical nature, and incorrect representations of wave packets. Proper understanding of dispersive errors would serve as a foundation for improving the shock capturing capabilities of least squares methods. However, proper analysis is more challenging in the context of least squares methods than in finite difference methods. The purpose of this study is to reasonably quantify the capabilities of least squares methods to correctly capture the dispersive relations in hyperbolic conservation laws.