

A fully discrete quadrature method for quasilinear hyperbolic problems

*M. Ganesh*¹ and **K. Mustapha*²

¹ Colorado School of Mines, Golden, Colorado, USA.

² University of New South Wales, Sydney, Australia.

We propose, analyse and demonstrate a modified Crank-Nicolson finite element method with quadrature for solving quasilinear advection-diffusion-diffusion equations of hyperbolic type. We seek twice continuously differentiable approximate solutions for the second order hyperbolic problems. Our computer implementable scheme includes discretization in time and space as well quadrature approximation for the Galerkin-type integrals. We prove that for sufficiently small time step-size, our scheme achieves optimal order accuracy in time and H^2 norm in space. We demonstrate by numerical experiments optimal order convergence of our scheme in L^2 , H^1 and H^2 norms.