

Some new error estimates for finite element methods for second order hyperbolic equations using the Newmark method

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We consider a family of conforming finite element schemes with piecewise polynomial space of degree k in space for solving second order hyperbolic equations. The discretization in time is performed using the Newmark method. A new *a priori estimate* is proved. Thanks to this new *a priori estimate*, it is proved that the convergence order of the error is $h^k + \tau^{2+s}$ with s is either 0 or 2 in the discrete norms of $\mathcal{L}^\infty(0, T; \mathcal{H}^1(\Omega))$ and $\mathcal{W}^{1,\infty}(0, T; \mathcal{L}^2(\Omega))$, where h and τ are the mesh size of the spatial and temporal discretization, respectively.

References

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