INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS

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SHORT ABSTRACT

This thesis focuses on the development of Virtual Element Methods (VEM) for the general linear second-order hyperbolic problems on polygonal meshes. These problems arise in many areas of science and engineering, including fluid dynamics, acoustics, and electro-magnetics. The primary focus of this work is to analyse the convergence of virtual element approximations to the exact solutions for both semi-discrete and fully-discrete formulation. In addition to the standard wave equations, these problems involve additional damping terms (weak damping and/or strong damping terms) and require further analyses to derive optimal convergence results.

The research will include the development of algorithms and codes for the implementation of VEM, and several numerical experiments have been performed to demonstrate the accuracy, efficiency, flexibility and robustness of each proposed algorithms. The results of this research are expected to provide valuable insights into the use of VEM for the time-dependent hyperbolic problems and to contribute to the advancement of numerical techniques in this field.