Conservative Splitting Schemes for the PDEs in Metamaterial Electromagnetics and Fluid Dynamics

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The partial differential equations (PDEs) play an important role in describing the phenomenon of movement in physics, electromagnetics, acoustics and fluid dynamics. Due to their physical properties, the ability to preserve conservation properties of the original differential equation is an important task of the development of efficient numerical schemes. In the practical calculations, better algorithms should maintain some inherent physical properties of the original PDEs as much as possible. In this talk, we will present our results on conservative splitting schemes for electromagnetic wave propagations in metamaterials and on domain decomposition methods for multicomponent contamination flows in porous media. We will also talk theoretical results on conservation, stability and convergence and will give numerical examples to show their performances.