

MULTIPLICATIVE EXTRAPOLATION METHOD FOR CONSTRUCTING HIGHER ORDER SCHEMES FOR ORDINARY DIFFERENTIAL EQUATIONS

收稿日期 1991-3-18 修回日期 网络版发布日期 2006-11-13 接受日期

摘要
关键词
分类号

MULTIPLICATIVE EXTRAPOLATION METHOD FOR CONSTRUCTING HIGHER ORDER SCHEMES FOR ORDINARY DIFFERENTIAL EQUATIONS

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Abstract In this paper, we develop a new technique called multiplicative extrapolation method which is used to construct higher order schemes for ordinary differential equations. We call it a new method because we only see additive extrapolation method before. This new method has a great advantage over additive extrapolation method because it keeps group property. If this method is used to construct higher order schemes from lower symplectic schemes, the higher order ones are also symplectic. First we introduce the concept of adjoint methods and some of their properties. We show that there is a self-adjoint scheme corresponding to every method. With this self-adjoint schemes of lower order, we can construct higher order schemes by multiplicative extrapolation method, which can be used to construct even much higher order schemes. Obviously this constructing process can be continued to get methods of arbitrary even order.

Key words

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