

Legendre小波求解超奇异积分

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LEGENDRE WAVELET FOR SOLVING SUPERSINGULAR INTEGRAL

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摘要 超奇异积分的数值算法一直是近些年来研究的重要课题. 基于超奇异积分的 Hadamard 有限部分积分定义, 本文给出了利用 Legendre 小波计算超奇异积分的方法. 当奇异点位于区间内时, 由于 Legendre 小波具有很好的正交性、显式表达式以及小波函数的可计算性, 将区间内的奇异点变换到区间端点处, 再利用区间端点处 Hadamard 有限部分积分的定义, 进而可以计算 $p+1(p \in N^+)$ 阶超奇异积分. 文中最后给出的算例表明了该方法的可行性和有效性.

关键词: 超奇异积分 Legendre 小波 Hadamard 有限部分积分 近似值

Abstract: The numerical methods of supersingular integral are always an important topic in recent years. Based on the definition of Hadamard finite-part integral of the supersingular integral, we have given a method which calculates the supersingular integral by using Legendre wavelet in this paper. When the singular point is located in the interval, as Legendre wavelet has a better orthogonality, good explicit expression and computability of the wavelet function, we can convert the singular point of interval into the endpoint of interval, and then by making use of the definition of Hadamard finite-part integral where the singular point is located at the endpoint of interval, we can compute the $p+1(p \in N^+)$ order supersingular integral. Finally, the feasibility and validity of the method can be proved by the examples shown in the work.

Key words: Supersingular integral Legendre wavelet Hadamard finite-part integral Approximate solution

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