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doc_1		doc_2		decision	id
		authors	• Dong, Wei	NOT DUPLICATES	1094
		title	Development of Kinetic Schemes for the Numerical Solutions of the 3-D Euler and the Ideal Magnetohydrodynamics Equations		
		publication_date	1989-01-01 00:00:00		
		source	SupportedSources.CORE		
		journal			
		volume			
		doi	None		
		urls	• https://core.ac.uk/download/233208119.pdf		
		id	id1810167069451353938		
		abstract	The objective of this dissertation is to develop and apply kinetic schemes for the numerical solution of 3-D compressible Euler and ideal Magnetohydrodynamic: MHD) equations. By employing the so-called moment method strategy , kinetic schemes for the compressible Euler and ideal MHD equations are derived from the collisionless Boltzmann equation, which is upwind discretized. Then the moments of the upwind discretized collisionless Boltzmann equation are taken with a collision invariant vector and the appropriate distribution function to obtain the numerical scheme for the continuum Euler and ideal MHD equations. In this dissertation, for both the Euler and ideal MHD equations, initially the first-order accurate time-explicit KFVS and KWPS algorithms are derived, and then the first-order accurate time-implicit KFVS and KWPS algorithms are developed. The derivations are presented in the 3-D generalized coordinate system. A 3-D computational code for the solution of compressible Euler and ideal MHD equations in generalized curvilinear coordinate system is written and validated. The code has been written for the first-order time-explicit KWPS algorithm. However, it can be easily extended to include the time-implicit KWPS algorithm as well as both the time-explicit and time-implicit KFVS algorithms. The code is applied to calculate the inviscid Supersonic flow past an axisymmetric blunt body with and without the presence of a magnetic field. The effect of magnetic field in reducing the strength of the bow shock is analyzed. This dissertation makes a fundamental contribution to the development and application of kinetic schemes for the solution of fluid dynamics equations		
		versions			
	authors	• Wei Dong			
	title	Development of Kinetic Schemes for the Numerical Solutions of the 3-D Euler and the Ideal Magnetohydrodynamics Equations			
	publication_date	2010-01-01 00:00:00			
	source	SupportedSources.INTERNET_ARCHIVE			
	journal	Washington University in St. Louis			
	volume				
	doi	10.7936/k7j38qm1			
	urls	• https://web.archive.org/web/20200709141121/https://openscholarship.wustl.edu/cgi/viewcontent.cgi?article=1846&context=etd			
	id	id3538979801788042676			
	abstract				
	versions				