V.I. Ferronsky

Gravitation, Inertia and Weightlessness

Centrifugal and Gyroscopic Effects of the *n*-Body System's Interaction Energy



Contents

1	Introduction: Phenomenon of Gravitation, Inertia							
	and	Weightlessness	1					
	1.1	Newton's Law of Universal Gravitation	2					
	1.2	Einstein's Gravitation	18					
	1.3	Other Theories on Gravitation	20					
	1.4	Inertia Forces and Reference Systems	21					
	1.5	Effect of Weightlessness	23					
	References							
2	Gravitation, Inertia and Weightlessness as the Centrifugal							
	Effec	ts of Interaction Energy of the <i>n</i> -Body System	25					
	2.1	The Centrifuge as a Model of Dynamical Effects						
		of the <i>n</i> -Body's Interaction Energy and Its Potential Field	26					
	2.2	Illusion of Two-Body Mutual Attraction at Their						
		Gravitational Interaction	28					
	2.3	Relationship Between a Body's Moment of Inertia						
		and Outer Gravitational Field by Satellite Data	34					
	2.4	Observation of Moment of Inertia and Inner						
		Gravitational Field Oscillation During Earthquakes	43					
	2.5	Kinetic Energy of a Body at Gravitational Interaction						
		of Its Elementary Particles	44					
	2.6	Generalized Classical Virial Theorem as Equation						
		of Dynamical Equilibrium of a <i>n</i> -Body's Mass						
		Point System	45					
	2.7	Jacobi's <i>n</i> -Mass Point Problem and Centrifugal						
		Effects of the Reduced Inner Gravitational Field of a Body	53					
	Refe	rences	60					
3	Deri	vation of Unified Jacobi's Equation for Different						
	Туре	es of Physical Interactions	61					
	3.1	Derivation of Jacobi's Virial Equation from Newtonian						
		Equations of Motion	62					

	3.2	Derivation of Jacobi's Virial Equation for Dissipative	-
	3.3	Systems	70
	5.5	Equations	73
	3.4	Derivation of Jacobi's Virial Equation from Hamiltonian	75
		Equations	81
	3.5	Derivation of Jacobi's Virial Equation in Quantum	
		Mechanics	82
	3.6	General Covariant Form of Jacobi's Virial Equation	90
	3.7	Relativistic Analogue of Jacobi's Virial Equation	93
	3.8	Direct Derivation of the Equation of Virial Oscillation	
	2.0	from Einstein's Equations	96
	3.9	Derivation of Jacobi's Virial Equation in Statistical	100
	3.10	Mechanics	100
	5.10	of Dynamics of Natural Systems	103
	Refer	ences	105
			104
4		ion of Jacobi's Virial Equation for Self-gravitating	
	4.1	ms Solution of Kepler's Problem in Classical and Virial	105
	4.1	Approach	106
		4.1.1 The Classical Approach	106 107
		4.1.2 The Dynamic Approach	1107
	4.2	Solution of n-Body Problem in the Framework	110
		of Conservative System	113
	4.3	Solution of Jacobi's Virial Equation in Hydrodynamics	118
		4.3.1 The Hydrodynamic Approach	118
		4.3.2 The Virial Approach.	122
	4.4	The Hydrogen Atom as a Quantum Mechanical Analogue	
		of the Two-Body Problem.	124
	4.5	Solution of a Virial Equation in the Theory of Relativity	
	16	(Static Approach).	132
	4.6	General Approach to Solution of Virial Equation	124
	4.7	for a Dissipative System	134
	т. /	Oscillations	136
	4.8	Solution of the Virial Equation for a Dissipative System	144
	4.9	Solution of the Virial Equation for a System with Friction	147
	Refere	ences	149
5		rifugal Effects as the Mechanism of the Solar System	
5		tion from a Common Gaseous Cloud	151
	The Conditions for a Body Separation and Orbiting	151	
	5.1 5.2	The Structure of Potential and Kinetic Energies	154
		of a Non-uniform Body	155
		•	

	5.3	Equations of Oscillation and Rotation of a Body and Their Solution	158
	5.4	The Nature and Mechanism of Body's Shell	150
	5.4	Differentiation by Action of the Centrifugal Roche's	
			162
	<i></i>	Self-similarity Principle and Radial Component	102
	5.5		164
			104
	5.6	Charges-like Motion of Non-uniformities and Tangential	165
		Component of the Force Function for the force for the	167
	5.7	Continugar Nature of the Thommedels and Contons I offer the	107
	5.8	Initial Values of Mean Density and Radius	160
		of a Secondary Body	168
	Refer	ences	170
6	The I	Body's Evolutionary Processes as Centrifugal and Gyroscopic	
Ū	Effect		171
	6.1	Equilibrium Boundary Conditions for a Self-gravitating	
	0.1		172
	6.2		175
	6.3		181
	6.4		183
	6.5	Cosmochemical Effects	186
	0.5	Cosmoonennous Enfortes	187
			188
		0.5.2 Ottais	188
		0.5.5 Outwides	189
	6.6	Radial Distribution of Mass Density and the Body's	107
	0.0		189
	6.7	Oscillation Frequency and Angular Velocity of a Body	107
	0.7	Shell Rotation	198
		Diten redución () () () ()	199
			200
			200
	6.0	6.7.3 Angular Velocity of Shell Rotation	201
	6.8		202
		The conduct to the second s	202
			202
			204
		6.8.3 The Nature of Perturbations Based on Dynamic	205
		Equinorium:	205
		6.8.4 Rotation of the Outer Force Field and the Nature	200
			208
		6.8.5 The Nature of Possible Clockwise Rotation of the	010
			212
		6.8.6 The Nature of the Earth's Orbit Plane Obliquity	
		to the Sun's Equatorial Plane	213

		6.8.7	The Nature of Chandler's Effect of the Earth Pole				
			Wobbling	215			
		6.8.8	The Nature of Obliquity of the Earth's Equatorial				
			Plane to the Ecliptic				
		6.8.9	Tidal Interaction of Two Bodies.	216			
		6.8.10	Change in Climate as an Effect of Changes				
	Refere	ences	of the Earth's Orbit	217 218			
7							
/			Electromagnetic and Gravitational Field of a Celestial ntrifugal Mechanism of Its Energy Generation	221			
	7.1		magnetic Component of the Interacting Masses	222			
	7.2		al Energy of the Coulomb Interaction of Mass	226			
	1.24		S	224			
	7.3		on of Electromagnetic Energy by a Celestial	221			
			s an Electric Dipole	230			
	7.4	Centrifi	ugal and Quantum Effects of Generated				
			magnetic Energy	235			
	7.5		ature of the Star-Emitted Radiation Spectrum				
	Refer		· · · · · · · · · · · · · · · · · · ·	237			
8	Croot	tion and	Decay of a Hierarchic Body System by				
0			Effects of the Potential Field Energy Interaction	239			
	8.1		nship of the Jacobi Function and Potential Energy	459			
	0.1		litaneous Collision of <i>n</i> Particles	242			
	8.2		totic Limit of Simultaneous Collision of Mass				
			es for a Conservative System	243			
	8.3		totic Limit of Simultaneous Collision of Mass				
			es for a Non-conservative System	245			
	8.4	Asymp	totic Limit of Simultaneous Collision of Charged				
		Particle	es of a System	260			
	8.5		nship Between the Jacobi Function and Potential				
			for a System with High Symmetry	265			
		8.5.1	Systems with Spherical Symmetry	265			
		8.5.2	Poytropic Gas Sphere Model	269			
		8.5.3	A System with Elliptical Symmetry	274			
		8.5.4	System with Charged Particles	279			
	Refer	ences		280			
9	Conclusions						
				281 289			
Index							