

Contents

1	Introduction	1
1.1	Cartesian Coordinate	3
1.1.1	Waves in a Mid-latitude Channel	3
1.1.2	Waves on the Equatorial β -Plane	7
1.2	The Eigenvalue Equation for Waves on a Rotating Sphere	9
1.3	Invariant Theory and Its Application to a Sphere and a Spheroid	10
1.4	A Unified Approach to Wave Theory of the Shallow Water Equations	11
	References	12
2	Waves in a Channel on the Mid-latitude β-Plane	13
2.1	Kelvin Waves	15
2.2	Inertia-Gravity and Planetary Waves	15
2.3	Inertial Waves	19
2.4	Analytic Solutions of the Eigenvalue Problem and Eigenfunctions	20
	References	27
3	Waves in a Channel on the Equatorial β-Plane	29
	References	34
4	Planetary and Inertia-Gravity Waves in an Equatorial Channel on a Sphere	35
4.1	Introduction	35
	Reference	45
5	Planetary and Inertia-Gravity Waves in a Mid-latitude Channel on a Sphere	47
	Reference	53

6 Planetary and Inertia-Gravity Waves on the Rotating Spherical Earth	55
6.1 Baroclinic (i.e., “Thin”) Ocean	57
6.2 Barotropic (i.e., “Deep”) Ocean	60
6.2.1 Dispersion Relation of Planetary Waves	64
6.2.2 Dispersion Relation of Inertia-Gravity Waves	66
6.2.3 Eigenfunctions	67
References	68
7 Kelvin Waves on the Rotating Spherical Earth	69
Reference	76
Index	77

Shallow Water Waves on the Rotating Earth

Paldor, N.

2015, VIII, 77 p. 32 illus., 19 illus. in color., Softcover

ISBN: 978-3-319-20260-0