

Cambridge University Press

978-0-521-86383-4 - Relativistic Figures of Equilibrium

Reinhard Meinel, Marcus Ansorg, Andreas Kleinwächter, Gernot Neugebauer and David Petroff
Frontmatter[More information](#)

Contents

<i>Preface</i>	<i>page</i> vii
<i>Notation</i>	ix
1 Rotating fluid bodies in equilibrium: fundamental notions and equations	1
1.1 The concept of an isolated body	1
1.2 Fluid bodies in equilibrium	3
1.3 The metric of an axisymmetric perfect fluid body in stationary rotation	3
1.4 Einstein's field equations inside and outside the body	5
1.5 Equations of state	10
1.6 Physical properties	13
1.7 Limiting cases	16
1.8 Transition to black holes	26
2 Analytical treatment of limiting cases	34
2.1 Maclaurin spheroids	34
2.2 Schwarzschild spheres	38
2.3 The rigidly rotating disc of dust	40
2.4 The Kerr metric as the solution to a boundary value problem	108
3 Numerical treatment of the general case	114
3.1 A multi-domain spectral method	115
3.2 Coordinate mappings	128
3.3 Equilibrium configurations of homogeneous fluids	137
3.4 Configurations with other equations of state	153
3.5 Fluid rings with a central black hole	166
4 Remarks on stability and astrophysical relevance	177

Cambridge University Press

978-0-521-86383-4 - Relativistic Figures of Equilibrium

Reinhard Meinel, Marcus Ansorg, Andreas Kleinwachter, Gernot Neugebauer and David Petroff

Frontmatter

[More information](#)

vi

Contents

<i>Appendix 1 A detailed look at the mass-shedding limit</i>	181
<i>Appendix 2 Theta functions: definitions and relations</i>	187
<i>Appendix 3 Multipole moments of the rotating disc of dust</i>	193
<i>Appendix 4 The disc solution as a Bäcklund limit</i>	203
<i>References</i>	208
<i>Index</i>	216