

Complex General Relativity

This book is written for theoretical and mathematical physicists and mathematicians interested in recent developments in complex general relativity and their application to classical and quantum gravity. Calculations are presented by paying attention to those details normally omitted in research papers, for pedagogical reasons. Familiarity with fibre-bundle theory is certainly helpful, but in many cases I only rely on two-spinor calculus and conformally invariant concepts in gravitational physics. The key concepts the book is devoted to are complex manifolds, spinor techniques, conformal gravity, $\mathbb{CP}^1$ -planes, $\mathbb{CP}^1$ -surfaces, Penrose transform, complex 3+1 – space-time models with non-vanishing torsion, spin- fields and spin- potentials. 22 Problems have been inserted at the end, to help the reader to check his understanding of these topics. Thus, I can find at least four reasons for writing yet another book on spinor and twistor methods in general relativity: (i) to write a textbook useful to – training graduate students and research workers, where two-component spinor calculus is the unifying mathematical language.

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