Preface

This volume presents contributions focused on recent developments of CR geometry and overdetermined systems. Some of the papers are based on the lectures delivered at a conference of the same title held at Osaka, Japan, from December 19 to 21, 1994, on the occasion of Kuranishi's 70th birthday.

The notion of CR manifold is an abstraction of a smooth boundary of a complex manifold or a complex space equipped with the tangential Cauchy-Riemann operator $\overline{\partial}_b$, where a formal integrability condition is imposed as in the case of an almost complex structure to be a complex structure. When the strict pseudoconvexity is assumed, one can employ differential geometric formalism and the method of harmonic integrals for the $\overline{\partial}_b$ complex analogous to the $\overline{\partial}$-Neumann problem. How does the CR structure on the boundary determine the complex structure inside? This is a central theme of CR geometry. A fundamental question is the embeddability of a CR manifold M as a real hypersurface of a complex space. An affirmative answer for the local embeddability was given by Kuranishi under the assumption that $\dim_{\mathbb{R}} M$ is not too small, indeed, $\dim_{\mathbb{R}} M \geq 7$ is sufficient. ($\dim_{\mathbb{R}} M$ must be odd.) The case $\dim_{\mathbb{R}} M = 3$ is exceptional, and most of the CR structures on M are not embeddable even when M is compact.

In the early 1970s, Kuranishi proposed to develop a deformation theory of isolated singularities via that of embeddable CR structures. His idea was presented in 1975 by series of lectures at the AMS summer institute, Williamstown, and at RIMS, Kyoto University. Since then, great progress was made of the theory and applications of CR geometry, synchronously with attempts to realize Kuranishi's idea. This volume reports on such progress and related topics as follows.

Methods of studying isolated singularities are developed since 1975, and the article by Ohsawa overviews such development. To investigate the deformations of a three dimensional CR manifold, one must consider the spaces of embeddable and non-embeddable CR structures, and this is done in the papers by Bland, Epstein and Lempert. The local embedding problem for 5-dimensional CR manifolds is still open, and Webster investigates this through a model problem. The paper by Luk and Stephen Yau discusses problems related to the minimal embedding dimension of a compact CR manifold in the Euclidean space. Since the work of E. Cartan, the method of prolongation has been successfully used in CR geometry. The paper by Han and Yoo determines the freedom of the CR mappings via the prolongation, while Veloso discusses