

Ordinary Differential Equations

Part I of this book deals with singularly perturbed two-point boundary value problems. This field of research is of interest in its own right and also serves as an introduction to the more complicated problems posed in higher dimensions that we shall meet later in Parts II, III and IV. An initial discussion of analytical techniques such as maximum principles, asymptotic expansions and stability estimates for the solution of the boundary value problem provides the background needed for the numerical analysis of these ordinary differential equations. Then finite difference, finite element and finite volume methods are presented and analysed, error estimates are derived in various norms, and the relevance of mesh selection is examined. The material here is explained in detail in order to lead the reader gently into this fascinating world.