Preface

This book is an introductory text intended for graduate students interested in computational mathematics. Some chapters are also suitable for advanced undergraduate students, as well as researchers and practitioners working in related areas. The book introduces numerical methods and selected applications of the Laplacian operator and the Poisson equation. Part I focuses on rectangular meshes and grids, drawing on the second author's lecture notes and projects on numerical PDEs. Part II covers triangulated surfaces and point clouds, derived from the first author's topic courses and projects.

We are grateful to Mr. William R. Francis, Dr. Hao Li, Dr. Chen Liu, and Dr. Xinyu Liu for reading Part I and providing valuable comments. We acknowledge Dr. Xinyu Liu for assistance with writing Section 4.1.5 and Mr. Emmanuel Gil Torres for his contribution to Section 4.4. Our sincere gratitude goes to Mr. Suyi Gao and Mr. Yineng Chen for their efforts in typing the lecture notes that form the basis of Chapters 5 and 6 in Part II. We also wish to thank all the students who participated in these courses or read these lecture notes for their thoughtful discussions, questions, and feedback, which have greatly improved the presentation and clarity of the material. We acknowledge the use of AI tools such as ChatGPT, Gemini, and Grok for assistance in preparing some of the figures.

Last but not least, we are grateful to the National Science Foundation for funding our past research projects that contributed to portions of this book. We are also grateful for the generous support provided by the Book Initiative of the Office of the Provost at Purdue University.

> RONGJIE LAI AND XIANGXIONG ZHANG Department of Mathematics, Purdue University