

# Introduction to Inverse Problems in Imaging

## Second Edition

Mario Bertero  
Patrizia Boccacci  
Christine De Mol



CRC Press

Taylor & Francis Group

Boca Raton London New York

---

CRC Press is an imprint of the  
Taylor & Francis Group, an **informa** business

# Contents

---

Preface to the first edition . . . . .	ix
Preface to the second edition . . . . .	xi
Author Bios . . . . .	xiii
Acronyms . . . . .	xv

1 Introduction . . . . .	1
--------------------------	---

## Part I: Image Deconvolution

---

2 Examples of image blurring . . . . .	15
3 The ill-posedness of image deconvolution . . . . .	49
4 Quadratic Tikhonov regularization and filtering . . . . .	71
5 Iterative regularization methods . . . . .	105

## Part II: Linear Inverse Problems

---

6 Examples of linear inverse problems . . . . .	135
7 Singular value decomposition (SVD) . . . . .	163
8 Inversion methods revisited . . . . .	183
9 Edge-preserving regularization . . . . .	213
10 Sparsity-enforcing regularization . . . . .	237

## Part III: Statistical Methods

---

11 Statistical approaches to linear inverse problems . . . . .	259
12 Statistical methods in the case of additive Gaussian noise . . . . .	271
13 Statistical methods in the case of Poisson data . . . . .	281
14 Conclusions . . . . .	307
References . . . . .	323
Index . . . . .	337