

# Contents

|          |   |           |
|----------|---|-----------|
| <b>1</b> | <b>Explicit-Implicit Methods with Applications to Banach Space Valued Functions in Abstract Fractional Calculus</b> | <b>1</b>  |
| 1.1      | Introduction  | 1         |
| 1.2      | Semi-local Convergence for Implicit Methods   | 3         |
| 1.3      | Semi-local Convergence for Explicit Methods   | 9         |
| 1.4      | Applications to $X$ -valued Fractional Calculus   | 12        |
|          | References  | 19        |
| <b>2</b> | <b>Convergence of Iterative Methods in Abstract Fractional Calculus</b>   | <b>21</b> |
| 2.1      | Introduction  | 21        |
| 2.2      | Semi-local Convergence for Implicit Methods   | 23        |
| 2.3      | Semi-local Convergence for Explicit Methods   | 27        |
| 2.4      | Applications to Abstract Fractional Calculus  | 29        |
|          | References  | 39        |
| <b>3</b> | <b>Equations for Banach Space Valued Functions in Fractional Vector Calculi</b>                                     | <b>41</b> |
| 3.1      | Introduction  | 41        |
| 3.2      | Semi-local Convergence for Implicit Methods   | 43        |
| 3.3      | Semi-local Convergence for Explicit Methods   | 47        |
| 3.4      | Applications to $X$ -valued Fractional and Vector Calculi   | 49        |
|          | References  | 57        |
| <b>4</b> | <b>Iterative Methods in Abstract Fractional Calculus</b>  | <b>59</b> |
| 4.1      | Introduction  | 59        |
| 4.2      | Semi-local Convergence for Implicit Methods   | 61        |
| 4.3      | Semi-local Convergence for Explicit Methods   | 65        |
| 4.4      | Applications to $X$ -valued Fractional Calculus   | 67        |
|          | References  | 71        |

|           |  |            |
|-----------|--|------------|
| <b>5</b>  | <b>Semi-local Convergence in Right Abstract Fractional Calculus . . .</b>                          | <b>73</b>  |
| 5.1       | Introduction . . . . .   | 73         |
| 5.2       | Semi-local Convergence for Implicit Methods . . . . .  | 75         |
| 5.3       | Semi-local Convergence for Explicit Methods . . . . .  | 79         |
| 5.4       | Applications to $X$ -valued Right Fractional Calculus . . . . .                                    | 81         |
|           | References . . . . .   | 86         |
| <b>6</b>  | <b>Algorithmic Convergence in Abstract <math>g</math>-Fractional Calculus . . . . .</b>            | <b>87</b>  |
| 6.1       | Introduction . . . . .   | 87         |
| 6.2       | Semi-local Convergence Analysis . . . . .  | 88         |
| 6.3       | Applications to $X$ -valued Modified $g$ -Fractional Calculus . . . . .                            | 92         |
|           | References . . . . .   | 104        |
| <b>7</b>  | <b>Iterative Procedures for Solving Equations in Abstract Fractional Calculus . . . . .</b>        | <b>105</b> |
| 7.1       | Introduction . . . . .   | 105        |
| 7.2       | Semi-local Convergence for Implicit Methods . . . . .  | 107        |
| 7.3       | Semi-local Convergence for Explicit Methods . . . . .  | 113        |
| 7.4       | Applications to Abstract Fractional Calculus . . . . .   | 117        |
|           | References . . . . .   | 119        |
| <b>8</b>  | <b>Approximate Solutions of Equations in Abstract <math>g</math>-Fractional Calculus . . . . .</b> | <b>121</b> |
| 8.1       | Introduction . . . . .   | 121        |
| 8.2       | Semi-local Convergence Analysis . . . . .  | 122        |
| 8.3       | Applications to $X$ -valued $g$ -Fractional Calculus . . . . .                                     | 126        |
|           | References . . . . .   | 136        |
| <b>9</b>  | <b>Generating Sequences for Solving in Abstract <math>g</math>-Fractional Calculus . . . . .</b>   | <b>139</b> |
| 9.1       | Introduction . . . . .   | 139        |
| 9.2       | Semi-local Convergence Analysis . . . . .  | 140        |
| 9.3       | Applications to $X$ -valued $g$ -Fractional Calculus of Canavati Type . . . . .                    | 144        |
|           | References . . . . .   | 152        |
| <b>10</b> | <b>Numerical Optimization and Fractional Invexity . . . . .</b>                                    | <b>155</b> |
| 10.1      | Introduction . . . . .   | 155        |
| 10.2      | Convergence of Method (10.1.2) . . . . .   | 155        |
| 10.3      | Multivariate Fractional Derivatives and Invexity . . . . .   | 157        |
|           | References . . . . .   | 161        |



<http://www.springer.com/978-3-319-69525-9>

Functional Numerical Methods: Applications to Abstract  
Fractional Calculus

Anastassiou, G.A.; Argyros, I.K.

2018, X, 161 p., Hardcover

ISBN: 978-3-319-69525-9