A survay about Fractional Order Calculus.

(Dated: February 14, 2024)

Here we will review derivations of fractional calculus.

PACS numbers: 73.63.-b, 75.70.Cn, 85.75.-d, 73.43.Qt

I. INTRODUCTION

II. FRACTIONAL ORDER INTEGRATION

III. FRACTIONAL ORDER DIFFERENTATION

A. Reimann-Liouvile FOD

B. Gronvald-Letnikov FOD and FOI

C. Caputo FOD

D. The relation between RL, GL, and Caputo FOD

IV. FOURIER AND LAPLACE TRANSFORMATIONS

V. NUMERICAL METHODS OF SOLUTIONS OF ORDINARY DIFFERENTIAL EQUATIONS

A. Multi linear methods for the solutions of ODEs

B. Runge-Cutta

VI. NUMERICAL METHODS FOR SOLVING FRACTIONAL ORDER DIFFERENTIAL EQUATIONS(FODE)

A. Multi linear methods for the solutions of FODEs

B. Runge-Cutta

VII. HIGHER ORDER FINITE DIFFERENCE FOD

A. Higher order finite difference for integer order derivatives

B. Higher order finite difference for FOD

VIII. NUMERICAL IMPLEMENTATION

IX. TRANSIENT SIMULATION OF ELECTRICAL CIRCUITS(PASSIVE PARTS ONLY)

A. Simulation of parts without FO components

B. Simulation of parts with FO components

C. Implementation of transient algorithem

D. Inclusion of SPICE net lists

X. SOME APPLICATIONS OF FOC IN THE ELECTROCHEMISTRY

XI. POSSIBLE INTEGRATION INTO QUCS

ACKNOWLEDGMENTS

XII. APPENDIX