BOOK CHAPTER No.: Part II-03 - COVID 19. REVIEW

Title: AN SEIR EPIDEMIC MODEL OF FRACTIONAL ORDER TO ANALYZE THE EVOLUTION OF THE COVID-19 EPIDEMIC IN ARGENTINA

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This chapter presents a case study of the evolution of COVID-19 epidemic in Argentina, specifically in Buenos Aires and neighboring areas (Regin Metropolitana de Buenos Aires - RMBA). The analysis is performed by applying an SEIR (Susceptible-Exposed-Infected-Recovered) diffusion model of fractional order in time, which allows for the incorporation of hereditary properties in the system.

In my opinion this Chapter is suitable to be included in the Book "Mathematical Modelling and Analysis of Infectious Disease Problems (COVID-19)" and can be published with minor revisions. In this way, I suggest that the authors address the following comments:

- **Abstract**, 6th line:

  Remove "the" in the sentence: "In the the SEIR model, individuals are divided into four classes, ..."

- **1 Introduction** (page 2), First paragraph, 5th line:

  Replace "still increasing at July 15th" by "still increasing by the end of July"

- **1 Introduction** (page 2), Last paragraph, last line:

  Replace "dead individuals" by "dead individuals per day"

- **Section 2 The Caputo derivative and initial value problems** (page 3) first line:

  Replace "$D_c^\nu(u(t)$" by "$D_c^\nu u(t)$" (remove parenthesis)

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- **Section 2 The Caputo derivative and initial value problems** (page 3) Eq.(1):

  Replace "$D_c^\nu(f(t)$ " by "$D_c^\nu f(t)$ " (remove parenthesis)

- **Section 2 The Caputo derivative and initial value problems** (page 3) 3rd paragraph, 2nd line:

  Replace "$t_n = n\Delta t, n = 0, 1, , \cdots$" by "$t_n = n\Delta t, n = 0, 1, \cdots$" (remove a comma)

- **Section 2 The Caputo derivative and initial value problems** (page 3) Eq.(2):

  Replace "$D_c^\nu(f(t)|_{t_{n+1}}$ " by "$D_c^\nu f(t)|_{t_{n+1}}$" (remove parenthesis)

- **Section 3 The classical and fractional-order SEIR models** (page 4) first line of Eq.(6):

  Replace "Λ^ν" by "$\mu^\nu N$"

- **Section 3 The classical and fractional-order SEIR models** (page 4) Eq.(7):

  Replace "μ^μ" by "μ^ν"

- **Subsection 4.1 Validation of the GMMP algorithm** (page 5) first paragraph, 2nd line:

  Replace "fractional orders $\nu = 1, 0.9$ and 0.8." by "fractional orders $\nu = 0.9$ and 0.8."

- **Section 5 Analysis of the COVID-19 epidemic in the RMBA** (page 9):

  a) I suggest to update the analysis using data at least up to July 31st.

  b) Therefore in the 2nd paragraph, 3rd line, authors would replace:

  "from day 1 (March 9, 2020) to day 120 (July 6th, 2020)" by "from day 1 (March 9, 2020) to day 145 (July 31th, 2020)"

c) The authors should include an analysis of variations in the results associated with changes in the initial number of infected individuals.

- **Section 5 Analysis of the COVID-19 epidemic in the RMBA** (page 10) 3rd paragraph, line 3:

  Complete the sentence "shows a decay of the in the simulated curves"

- **Section 5 Analysis of the COVID-19 epidemic in the RMBA** (page 14) last sentence:

  Replace " and the peak infected individuals and number of casualties increase " by " and the peak of infected individuals and the number of casualties increase "

- **6 Appendix** (page 16) All lines of Eq.(13):

  Replace "$b_{j,n+1)}$" by "$b_{j,n+1}$" (remove parenthesis)

- **6 Appendix** (page 17) All lines of Eq.(14):

  Replace "$f_j^\nu (S_{n+1}^p, E_{n+1}^p, I_{n+1}^p, R_{n+1}^p))$" by "$f_j^\nu (S_{n+1}^p, E_{n+1}^p, I_{n+1}^p, R_{n+1}^p)$" (remove the last parenthesis)

- **References** (page 17):

  Update reference [2]