Applied and Computational Mathematics

Special Issue on "Fuzzy logic and its application to modeling epidemies: Coronavirus and beyond"

Aims and scope

Infectious diseases have constituted a serious threat to humanity in the last centuries, as they contribute to a great number of deaths amongst humankind. They have potentially shape human story and most of them remain within our environment today. Among them, one can list the 28 devastating infectious diseases that have killed many humans in the last centuries, including: The new coronavirus, which belong to a large class of viruses causing respiratory illnesses that first appeared in Wuhan, China, in December 2019. The smallpox that emerged about 3000 years ago, it is believed they outbreak started in Egypt or India. The Plague, caused by a bacterium carried by fleas, this disease wiped out roughly a third of the population in Basel, Switzerland. Malaria, still with us nowadays and has devastated parts of Africa, where the disease is responsible of 20% of all childhood deaths. Influenza, which is a seasonal respiratory infection accounting for about 250000 to 500000 deaths a year across the globe. Tuberculosis is caused by the bacterium mycobacterium tuberculosis, which attacks the lung. HIV/AIDS responsible of about 770,000 death worldwide, is a potential disease that leaves its victims vulnerable to all kind of opportunistic diseases. Cholera, which causes acute diarrhea that if stay untreated can kill within hours. Rabies that causes more than 100000 of deaths each year. Pneumonia can be caused by a bacteria. Infectious diarrhea, the virus causes dehydration. Ebola, a fatal infection initiated by one of the 5 strains of Ebola virus. The variant Creutzfeldt-Jakob disease, a disease that human contract from eating beef from cows with Bovine Spongiform Encephalopathy. The Marburg, a virus that belongs to Filovirus family. The Middle East respiratory syndrome, is a bat-borne diseases similar to Ebola. Dengue, a mosquito-borne viruses, related to DENV1, DENV1, DENV1 and DENV4. Hantavirus that spreads to humans by rodents like mice, Anthrax, Superbug, Pertussis, Tetanus, Meningitis, Syphilis, SARS, Leprosy, Measles and Zika.

Due to their fatal effects to humanity, including social, financial, and educational, health and many others, humans have developed several techniques and undertook several researches from theoretical to practical point of view with the aim of fighting them.

One of the methods used to understand and predict the spread or the mortality rate is mathematical modelling, where observed facts are translated into mathematical equations to form a model. The obtained model is solved analytically or numerically dependent on if it is linear or nonlinear. However, it is important that the prediction, will be accurate if the translation from observed facts to mathematical equations is accurate. However, it is important to note that due to lack of truthful data and lack of knowledge regarding some of the above mentioned infectious diseases, mathematical models are sometime uncertain. Therefore predictions from these models could be inaccurate sometimes due to these reasons.

Mathematicians have introduced a new concept called fuzzy, a concept of which the limitations of applicability can significantly change to the context or conditions, instead of being set once for all. Indeed, this is the case in trying to have a full understanding, of the behaviours, spread and

live-span of the above mentioned infectious diseases. Sometimes their spread, and mutations, are not fixed and cannot sometimes be known, especially the latest called COVID-19. The aim of this special issue is devoted to the discussion underpinning the possible application of fuzzy to modelling the dynamic of the spread of devastating infectious diseases, in particular the coronavirus (COVID-19). The issue will therefore collect research papers with novel results focusing but not limited to:

- Fuzzy models including (systems of ordinary differential equations) for Coronavirus
- Fuzzy Spatial models (with partial differential equations), for Coronavirus
- Fuzzy traveling waves and similar topics;
- Fuzzy Agent-based models,
- Fuzzy virus dynamics models
- Fractional intra-host models
- Models based on stochastic approaches
- Fractional-fuzzy and application
- Fractal-Fractional-Fuzzy models for Coronavirus Pandemic
- Fuzzy and Markovian processes with applications in Coronavirus and others
- In general, fuzzy mathematical models for Coronavirus modelling

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Guidelines

Authors can submit their manuscripts through the online submission system www.acmij.az . They have to use "Corona-2020" for the submission. Only papers with new and outstanding results related to Coronavirus outbreak within this scope will be considered for review. Routinely submissions and papers with only theoretical values will be directly rejected without being sent to review. Please however feel free to contact chief_ed@acmij.az, f_aliev@yahoo.com or executive_ed@acmij.az. Please note that papers will have to adhere to the journal space and style requirements.

Important dates:

Opened submission date: **1 June 2020**

Submission Deadline: **31 August 2020**

Publication of Special Issue: **December 2020**