

## ICFDA 2027 — Open Invited Track

### Fractional Calculus Theory, Artificial Intelligence and Mathematical Modeling of Biology, Biomedicine and Engineering Applications

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#### Our Open Invited Track Pulses:

Complex dynamic behaviors are generated by modified networks relying upon multiple parameter values of models and co-existing synchronized stimuli, generating different patterns of chaos, bifurcation, periodic and excitable spiking, resting along with bursting behaviors with minimum computational errors possible along with the quantitative analysis of big data facilitating the determination of system attributes. Dynamical processes and systems of fractional order in relation to natural and artificial phenomena can be modeled by ODEs or PDEs with integer order. Conception of fractals, difference and differential equations, AI, ML-based theories, analyses, models and applications, and so forth besides their multilevel relationship enable establishing novel models toward optimized solutions.

Fractional calculus (FC) is a subject matter regarding computer vision owing to its capability of capturing non-local spatial-temporal dependencies, memory effects and fine-grained intensity variations. FC can provide a critical mathematical structure in medicine, biology and oncology, conjugating classical integer-order differential models with the complex, non-local dynamics of real biological tissues. Mathematical models of tumor growth, for instance, are employed for designing and implementing optimal treatment strategies so that essential biological mechanisms underlying cancer progression can be captured.

Consequently, our open invited track aims to elucidate the ways that could generate solution-oriented applicable approaches to pertinent challenges encountered in different domains of mathematics, medicine, neuroscience, physics, neurobiology, epidemiology, mathematical biology, biomedicine, engineering, data science, computer science, applied

disciplines, among others by extrapolating new mathematical directions based on the groundwork of theoretical mathematics reinforcing applications. Within such systems and across various applications, FC, discrete FC, discrete dynamical systems, fractional-fractals, fractional wavelet, fractional entropy, AI, ML, and other mathematical models are employed for identifying self-similar patterns, symmetries, singularities, regularities, uncertainties, complexities, and so forth, stemming from otherwise irregular data.

The potential topics include, but are not limited to:

- Fractional calculus and neural neuron dynamics
- Discrete fractional models and discrete dynamical systems
- Fractional calculus in biology/biomedicine/epidemiology/neurology
- Applications of fractional entropy/wavelets/fractals/quantum
- Multi-fractional artificial intelligence
- Data-driven fractional modeling in complex biological systems
- Chaos, bifurcation, stability and sensitivity
- Stochastic analysis, modeling and/or stochastic processes

Among the many other related points with mathematical, theoretical, numerical and computational modeling aspects.