

# A fractional-order dynamic approach to vector equilibrium problems with partial order constructed by a polyhedral cone

Vo Minh Tam<sup>1</sup>, Jein-Shan Chen<sup>2</sup>, Jann-Long Chern<sup>3</sup> and Akiko Takeda<sup>4</sup>

**Abstract:** In this talk, we propose a dynamical system for solving a class of vector equilibrium problems with partial order constructed by a polyhedral cone which is generated by some matrix. Unlike the traditional dynamical models, it particularly possesses the feature of fractional-order system. The so-called Mittag-Leffler stability of the dynamical system is investigated, which verifies the convergence to the solution of the corresponding vector equilibrium problems. This result is established by applying the techniques involving Caputo fractional derivatives, strong pseudo-monotonicity and Lipschitz-type continuity assumptions with partial ordering based on a polyhedral cone. We also give numerical implementations to illustrate the proposed approach.

---

<sup>1</sup> Department of Mathematics, Dong Thap University, Cao Lanh City 870000, Dong Thap Province, Vietnam

Department of Mathematics, National Taiwan Normal University, Taipei 116059, Taiwan  
*vmtam@dthu.edu.vn*

<sup>2</sup> Department of Mathematics, National Taiwan Normal University, Taipei 116059, Taiwan  
*jschen@math.ntnu.edu.tw*

<sup>3</sup> Department of Mathematics, National Taiwan Normal University, Taipei 116059, Taiwan  
*chern@gapps.ntnu.edu.tw*

<sup>4</sup> Department of Mathematical Informatics, Graduate School of Information Science and Technology, University of Tokyo, Tokyo, Japan  
RIKEN, Center for Advanced Intelligence Project, Tokyo, Japan  
*takeda@mist.i.u-tokyo.ac.jp; akiko.takeda@riken.jp*