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Desineni Subbaram Naidu

University of Minnesota Duluth, USA

BIOGRAPHY

Desineni Subbaram Naidu received MTech and PhD Degrees in Electrical Engineering (with specialization in Control Systems Engineering), from Indian Institute of Technology (IIT), Kharagpur, INDIA in 1979. Since August 2014, he has been with University of Minnesota Duluth as Minnesota Power Jack Rowe Endowed Chair and Professor of Electrical Engineering. He received twice the Senior National Research Council (NRC) Associateship award from the US National Academy of Sciences (NAS) and is an elected Fellow of the Institute of Electrical and Electronic Engineers (IEEE) since 1995 (now Life) and an elected Fellow of the World Innovation Foundation, UK in 2003. His teaching and research interests are in Electrical Engineering (Power and Energy); Control systems; Optimal control: Theory and applications; biomedical sciences and engineering (Prosthetics and infectious diseases); Large scale systems and singular perturbations and time scales (SPaTS): Control theory and applications; guidance and control of aerospace systems: Aeroassisted orbital transfer for mars mission and Uninhabited aerial vehicles (UAVs); Advanced control strategies for heating, Ventilation, & air-conditioning (HVAC); Modeling, Sensing and control of gas metal arc welding (GMAW) and has over 200 journal and conference publications including nine books.

dsnaidu@d.umn.edu

CONVERGENCE AND INTEGRATION OF LIFE SCIENCES AND ENGINEERING- INFECTIOUS DISEASES

Based on recent research theme of the "convergence" of life sciences, physical sciences, engineering and the "integration" of Humanities and arts with sciences, engineering and medicine, designing and evaluating the treatment strategies for infectious diseases are addressed. The infectious diseases addressed are human immunodeficiency virus (HIV) and measles, whose behaviour is modeled and described by a set of dynamical differential equations amenable for "integrating" with engineering (i.e. optimal control theory and applications. However, when detailed models for infectious diseases are considered for devising treatments, the resulting optimal control laws result in treatment plans for infectious diseases complex and unfeasible for practical implementation. These recent research investigations present a feasible long term optimal control treatment through the application of singular perturbation and time scales (SPaTS) methods. A nonlinear HIV model is decoupled into lower order, slow and fast subsystems based on its inherent time scale behaviour. Distinct slow and fast linear quadratic regulator (LQR) based optimal control laws are designed and applied in a conventional long term optimal treatment plan. The extensive simulation results manifest the effectiveness of the proposed method.