CONCERNING PERIOD OF PREPARATION
& QUALIFYING EXAMINATION

Time in Preparation: 2013—2017

Qualifying Examination Passed: Spring 2014

Published Papers:

C. Mukasa, V. A. Aalo and G. P. Efthymoglou, "Performance analysis of a mobile receiver in a field of Poisson interferers,"*2017 38th IEEE Sarnoff Symp.*, Newark, Sept. 2017.

V. A. Aalo and **C. Mukasa**, "Impact of interference on the coverage and connectivity of ad hoc networks in a fading environment," *AEU - Int. J. Electron. and Commun.*, 2015.

V. A. Aalo, **C. Mukasa** and G. P. Efthymoglou, "Effect of Mobility on the outage and BER Performances of digital transmissions over Nakagami-m fading channels," *IEEE Trans. Veh. Techn.*, vol. 65, no. 4, pp. 2715-2721, Apr. 2016.

G. P. Efthymoglou, **C. Mukasa** and V. A. Aalo, "User association to small cells in the presence of Nakagami-m fading and co-channel interference," *2016 23rd ICT*, 2016.

C. Mukasa, V. A. Aalo and G. P. Efthymoglou, "On the Performance of a dual-hop network with a mobile relay in a Nakagami fading environment," *2016 21st IEEE CAMAD*, Toronto, Oct. 2016.

C. Mukasa, V. A. Aalo and G. P. Efthymoglou, "Exact distributions for aggregate interference in wireless networks with a Poisson field of interferers," *2016 12th IEEE WiMob)* New York, Oct. 2016.

FAU

COLLEGE OF ENGINEERING
& COMPUTER SCIENCE
Florida Atlantic University

FLORIDA ATLANTIC UNIVERSITY

COLLEGE OF ENGINEERING & COMPUTER SCIENCE

announces the

Ph.D. Dissertation Defense

of

CONSTANTINE MUKASA

for the degree of

DOCTOR OF PHILOSOPHY (PH.D.)

Oct. 09, 2017 at 2 p.m.

in

Engineering East, Room 405

777 Glades Road

Boca Raton, FL

DEPARTMENT: Computer and Electrical Engineering and Computer Science

DISSERTATION TITLE: “Stochastic Modeling of Wireless Communications in a Fading Environment via the Fox's *H*-Function”

CHAIR OF THE CANDIDATE’S PH.D. COMMITTEE:
Valentine A. Aalo, Ph.D.

PH.D. SUPERVISORY COMMITTEE:
Perambur S. Neelakanta, Ph.D.
Imadeldin Mahgoub, Ph.D.
Ionut Cardei, Ph.D.

ABSTRACT OF DISSERTATION

Stochastic Modeling of Wireless Communications in a Fading Environment via the Fox's *H*-Function

In wireless communication systems, it is well known that the instantaneous received signal power is a random variable that follows a given distribution. The randomness mainly stems from effects such as multipath fading, shadowing, and interference. Several distributions have been used in the literature to characterize the fading phenomenon. However, as new radio technologies emerge, the known distributions are deemed insufficient to fit simulated and measure data. Subsequently, as the wireless industry moves onto the fifth generation (5G), newer distributions are being proposed to well represent the received signal for new wireless technologies, including those operating in the millimeter-wave (mmWave) band. These are mainly application specific. Secondly, an explosion of new radio technologies and devices operating in the same limited radio spectrum is expected, which will thrust interference modeling in dense networks to the forefront due to overcrowding. Thirdly, the classical distributions used to model the received signal do not account for the fundamental inherent mobility feature for emerging radio technologies such as avionics systems (eg. drones). Consequently, in this dissertation, we propose the use of a unifying distribution, the Fox's *H*-function distribution, with subsume ability to represent several traditional and future distributions, as a statistical tool to evaluate performance of wireless communications systems. Additionally, two interference models, one with a fixed number and the other with a random number of interferers, are considered to derive interference statistics and further utilize the results to analyze system performance under the effect of interference. Finally, we extend the classical distributions to include the mobility regime for several wireless network topologies and perform network analysis. The analytical results are validated using computer simulations.