

## ASCC 2026 Best Student Paper Award Application Form

### I. Applicant Information

1. Name of student: Vivek Kumar
2. Present affiliation: Indian Institute of Technology Roorkee, Uttarakhand, India
3. Degree program (and the expected date of the degree): Ph.D
4. Paper title: Robust Triple-Parametric Fractional Control Strategy for Frequency Regulation Against Cyber Threats
5. Paper number: 228
6. Coauthors of the paper: Yogesh V. Hote
7. Date of application: May 6th, 2026

### II. Justification for Application

The present electricity sector is evolving significantly by integrating new technologies, including computers, open communication, IoTs, and control technologies. The main objective of the electrical grid is to maintain voltage and frequency stability. However, the ongoing improvement and development of modern power systems (PSs) have increased their vulnerability, making them more susceptible to cyberattacks that could degrade performance or destabilize the system. The intensity of cyberattacks could cause blackouts in the region, potentially affecting the entire industry. In recent years, incidents of cyberattacks against PSs have surged, notably the 2008 Florida outage and the Stuxnet virus targeting the Iranian nuclear facility at Natanz, U.S. power grid accidents (2009, 2012). Therefore, this research addresses the issue of cyber threats in PSs by proposing a revolutionary paradigm. Thus, this paper presents a unique triple-parametric fractional controller (TPFC) that combines the advantages of PI and PD controllers, eliminating the need for external control loops and enhancing system efficiency. We use the stability boundary locus methodology to determine the optimal controller configurations. The TPFC's efficacy is shown by simulation tests that mitigate random and step-load disturbances in the presence of various cyber threats (false data injection and location attacks) in microgrids, surpassing existing approaches while maintaining frequency stability. Furthermore, the performance assessment using simulation responses and integral errors clearly demonstrates the effectiveness of the proposed technique.

### III. Advisor Information

1. Name of advisor: Prof. Yogesh V. Hote    2. Email address: [yogesh.hote@ee.iitr.ac.in](mailto:yogesh.hote@ee.iitr.ac.in)
3. Advisor's affiliation: Indian Institute of Technology Roorkee, Uttarakhand, India
4. "I certify that the applicant above is/was the principal author of the paper and she/he is/was a student on the date of July 24, 2021."



**Signature:** \_\_\_\_\_