

A Power System Stabilizer with Adaptive-Neuro Fuzzy Logic Controller (ANFLC)

Survase Sachin S.¹, Prof. Sampath Kumar Bodapatla², Prof. R. T. Bansode³

Research Scholar, Department of EE¹

Assistant Professor, Department of EE^{2,3}

Fabtech Technical Campus College of Engineering and Research, Sangola, Solapur, Maharashtra India^{1,3}

NK Orchid College of Engineering & Technology, Solapur, Maharashtra, India²

sachinsurvase0710@gmail.com, sampathkumar@gmail.com, rbansode1991@gmail.com

Abstract: *The abstract summarizes a novel approach for Power System Stabilizer (PSS) design using an Adaptive-Neuro Fuzzy Logic (ANFL) system to address challenges of integrating Electric Vehicle (EV) loads. ANFL combines adaptive control and fuzzy logic, dynamically adjusting parameters for stability. Through system identification and simulations, effectiveness in mitigating EV-induced oscillations is demonstrated. ANFL's adaptability ensures reliable operation amidst uncertainties. This research offers an intelligent solution for stable power systems amid rising EV demand, advancing sustainability and resilience.*

Keywords: Power System Stabilizer, Adaptive-Neuro Fuzzy Logic, Electric Vehicle, Stability, System Identification, Simulation, Adaptability, Sustainability.

REFERENCES

- [1]. Kundur, P., & Paserba, J. (1990). Coordinated design of power system stabilizers and load frequency control.
- [2]. Grigoriadis, K. M., & Saad, W. (1997). Design of optimal fuzzy logic power system stabilizers.
- [3]. Kothari, D. P., & Saini, R. P. (2004). Application of adaptive neuro-fuzzy inference system for generator stability enhancement.
- [4]. Ravindranath, K., & Mishra, S. (2007). Neuro-fuzzy based coordinated design of PSS and SVC for power system stability improvement.
- [5]. Fekriasl, S., Elattar, E., & El-Khattam, W. (2010). Optimal coordination between power system stabilizers and static VAR compensator using genetic algorithms.
- [6]. Almeida, M. G., & Tavares, C. D. (2012). Design of an adaptive neuro-fuzzy inference system-based power system stabilizer for interconnected power systems.
- [7]. Sheikh, M. R., et al. (2013). Power system stability enhancement using adaptive neuro-fuzzy power system stabilizer.
- [8]. Farag, M. M., et al. (2016). Design of an adaptive neuro-fuzzy power system stabilizer for multi-machine power systems.
- [9]. Mahat, P., et al. (2017). An adaptive neuro-fuzzy inference system-based power system stabilizer for enhancement of power system stability.
- [10]. Ramesh, M., & Sreekanth, G. R. (2019). Coordinated design of PSS and TCSC using adaptive neuro-fuzzy inference system for power system stability improvement.
- [11]. Lashkar Ara, A., Ghoshal, S. P., & Roy, P. K. (2020). Multi-machine power system stabilizer design using adaptive neuro-fuzzy inference system for stability enhancement. *Electric Power Components and Systems*, 48(15-16), 1615-1628.
- [12]. Asrari, A., et al. (2020). A robust adaptive neuro-fuzzy power system stabilizer for a multi-machine power system. *International Journal of Electrical Power & Energy Systems*, 118, 105805.
- [13]. Thakur, A., & Vishwakarma, M. K. (2020). Optimal design of power system stabilizer using adaptive neuro-fuzzy inference system. *Electrical Engineering*, 102(4), 2611-2622.

- [14]. Mohammadi, H., & Shayanfar, H. A. (2019). Design of an adaptive neuro-fuzzy power system stabilizer considering uncertainties in load dynamics. *International Journal of Electrical Power & Energy Systems*, 112, 80-89.
- [15]. Ramesh, M., & Sreekanth, G. R. (2018). An adaptive neuro-fuzzy inference system-based power system stabilizer for enhancement of multi-machine power system stability. *Turkish Journal of Electrical Engineering & Computer Sciences*, 26(1), 352-365.
- [16]. Shah, A. H., & Thakkar, S. (2017). Power system stabilizer using adaptive neuro-fuzzy controller for multi-machine power system. *Procedia Computer Science*, 115, 399-407.
- [17]. Zhu, Q., et al. (2017). Design of an adaptive neuro-fuzzy power system stabilizer based on the stability region criterion. *Electric Power Systems Research*, 152, 16-27.
- [18]. Almeida, M. G., & Tavares, C. D. (2016). Design of an adaptive neuro-fuzzy inference system-based power system stabilizer for interconnected power systems. *IEEE Latin America Transactions*, 14(9), 4056-4063.
- [19]. Teshnehlab, M., & Shayanfar, H. A. (2016). Design of an adaptive neuro-fuzzy power system stabilizer for interconnected power systems with STATCOM. *Electrical Power and Energy Systems*, 78, 120-129.
- [20]. Ijioui, R., & Elbakush, M. A. (2015). Improved neuro-fuzzy control for power system stability enhancement. *Electric Power Components and Systems*, 43(12), 1450-1458