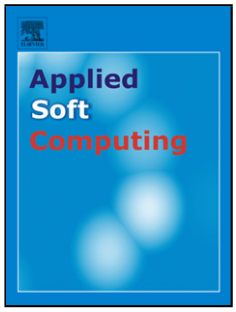

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PII: S1568-4946(18)30021-8
DOI: https://doi.org/10.1016/j.asoc.2018.01.015
Reference: ASOC 4662

To appear in: *Applied Soft Computing*

Received date: 6-2-2017
Revised date: 9-1-2018
Accepted date: 12-1-2018

Please cite this article as: Vahid Mohammadi, Sehraneh Ghaemi, Hamed Kharrati, PSO Tuned FLC for Full Autopilot Control of Quadrotor to Tackle Wind Disturbance Using Bond Graph Approach, Applied Soft Computing Journal https://doi.org/10.1016/j.asoc.2018.01.015

PSO Tuned FLC for Full Autopilot Control of Quadrotor to Tackle Wind Disturbance Using Bond Graph Approach

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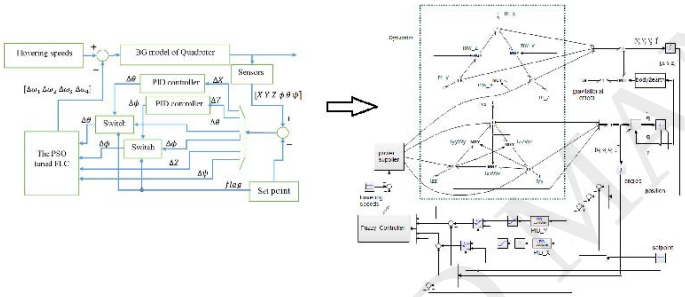
Graphical abstract



Highlights

- Quadrotor model in bond graph approach is considered
- An FLC-PID controller is proposed for full controlling the quadrotor
- Fuzzy rules are obtained via Particles Swarm Optimization (PSO)
- Gimbal lock problem is eliminated by quaternion equations
- Robustness of the controller against wind disturbance is simulated

Abstract *The ability of Bond Graph (BG) in modeling multi-domain structures results in a more precise and expansive interface. Hence, this paper develops the model of a quadrotor using BG approach. Then, the paper introduces and optimizes a Fuzzy Logic Controller (FLC) with the aim of making intelligent decisions close to human decisions. Additionally, a Particle Swarm Optimization (PSO) algorithm is utilized to have minimum 4 rules for FLC, which leads the controller to be quick. It is because a fast FLC is necessary in the next part to convert the*