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Multiple Parametric Faults Diagnosis for Power Electronic Circuits Based on Hybrid Bond Graph and Genetic Algorithm

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Abstract **--Aiming at the problem to diagnosis multiple parametric faults in power electronic circuits, a new diagnosis framework based on hybrid bond graph (HBG) and genetic algorithm (GA) is presented. Firstly, the circuits are modeled by HBG modeling technique, in which the equivalent models of the key components are considered. Then, a set of residuals equations and a fault signature matrix (FSM) are derived from the HBG model. Each faulty component exhibits their degradation symptoms on residuals equations. Thus, faults can be detected by comparing residuals with fault detection thresholds and isolated based on FSM. Finally, GA method is employed to identify the component faults. The fitness function of GA is constructed by the residuals equations in which the faulty components are contained. Simulation and experiment are carried out to verify the feasibility and effectiveness. The results show that the developed method is applicable to diagnosis both single and multiple parametric faults.**

Index Terms **–Fault identification; Genetic algorithm (GA); Hybrid Bond Graph (HBG); parametric faults diagnosis.**

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