Power Electronic Circuit Fault Diagnosis Method Based on GADF and Channel Split Residual Network

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Abstract

Power electronic circuits play an extremely important role in industrial systems. Parametric failure of components in these circuits are extremely prone to occur, which can easily evolve into catastrophic failures with time. Hence fault diagnosis of circuits can avoid catastrophic failures. In this paper, we propose a channel segmentation residual network (CSRN) for circuit fault diagnosis, in which Gram angular difference filed (GADF) is used to convert the original fault signal into a two-dimensional feature map for input into the CSRN. The channels of the input feature map are distinguished by selecting the main working channels through a channel segmentation mechanism and a Darwin selection mechanism for feature retention and deletion operations. The diagnostic performance of the proposed method is verified on the DC-DC circuit fault dataset, and the results show that the proposed CSRN achieves 97.92% fault classification accuracy for this circuit, which is 1.98%, 13.34% and 6.67% higher than other models, respectively.

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