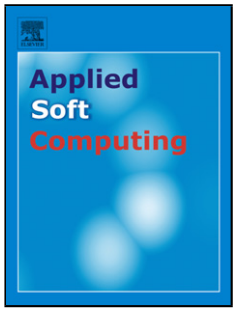

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Minimizing Harmonic Distortion in Power System with Optimal Design of Hybrid Active Power Filter using L-SHADE Algorithm

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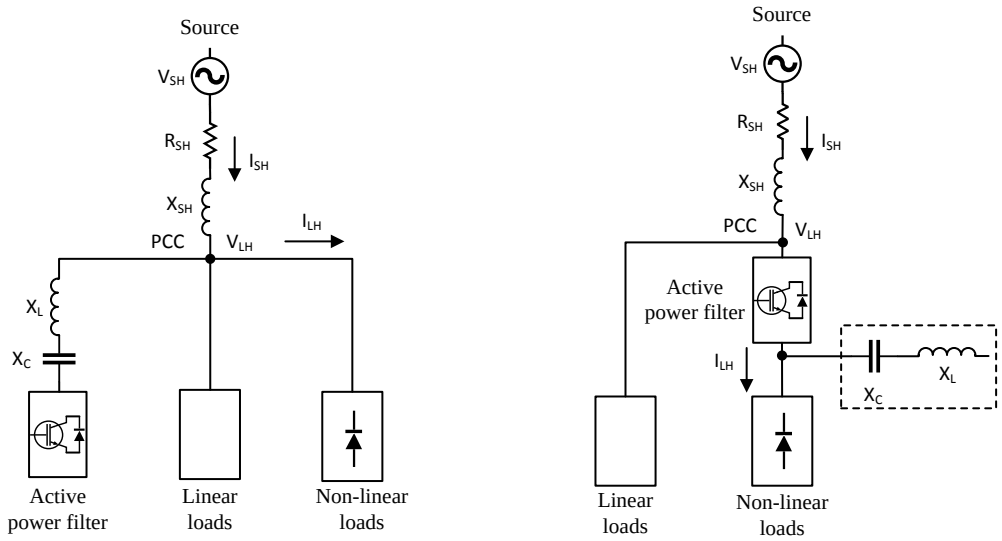
Graphical abstract



(a) Config.1: APF in series with shunt passive filter (b) Config.2: Combined series APF and shunt passive filter

Circuit configurations of Hybrid Active Power Filter

HIGHLIGHTS:

- Two popular topologies of Hybrid Active Power Filter are analyzed.
- Non-linear load and source are considered for the system under study.
- Application of L-SHADE algorithm is described in detail.
- Active filter gain, passive filter reactances are optimized.
- Output results of L-SHADE are compared with other evolutionary algorithms.

Abstract: Hybrid active power filter (HAPF) is an advanced form of harmonic filter combining advantages of both active and passive filters. In HAPF, selection of active filter gain, passive inductive and capacitive reactances, while satisfying system constraints on individual and overall voltage and current harmonic distortion levels, is the main challenge. To optimize HAPF parameters, this paper proposes an approach based on differential evolution (DE) algorithm called L-SHADE. SHADE is the