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Editors

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# Chapter 13

## Harmonic Estimator Design Using Teaching Learning Based Optimization



Aishwarya Mehta, Jitesh Jangid, Akash Saxena, Shalini Shekhawat,  
and Rajesh kumar

### 1 Introduction

Harmonic estimation is the first step towards the most popular power quality issue in the power system. Harmonics are distorted electrical signals, which possess frequencies of multiples of the fundamental frequency ( $f$ ) like  $3f$ ,  $4f$ ,  $5f$ , etc. Harmonic generation sources are non-linear devices, power converter, transformer and their sources. Harmonics have an adverse effect on power systems like losses in the electrical signal, reduce the life of electrical devices and functioning of electronic devices and  $I^2R$  losses in power system networks, etc.

In the Current Scenario, modern power system helps to fulfill the demand of consumers by reducing losses. This demand is increasing day by day which can be fulfill by non-linear devices. Non-linear devices help to transmit and distribute the bulk power from the power system. These non-linear devices do not follow Ohm's law and draw a large amount of power, which are cause of harmonics. Due to load variations, harmonics in the power system network vary continuously. Harmonics estimation is used to provide an accurate estimation of the phase and amplitude of the electrical signal. This accurate estimation helps to mitigate the losses of the

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