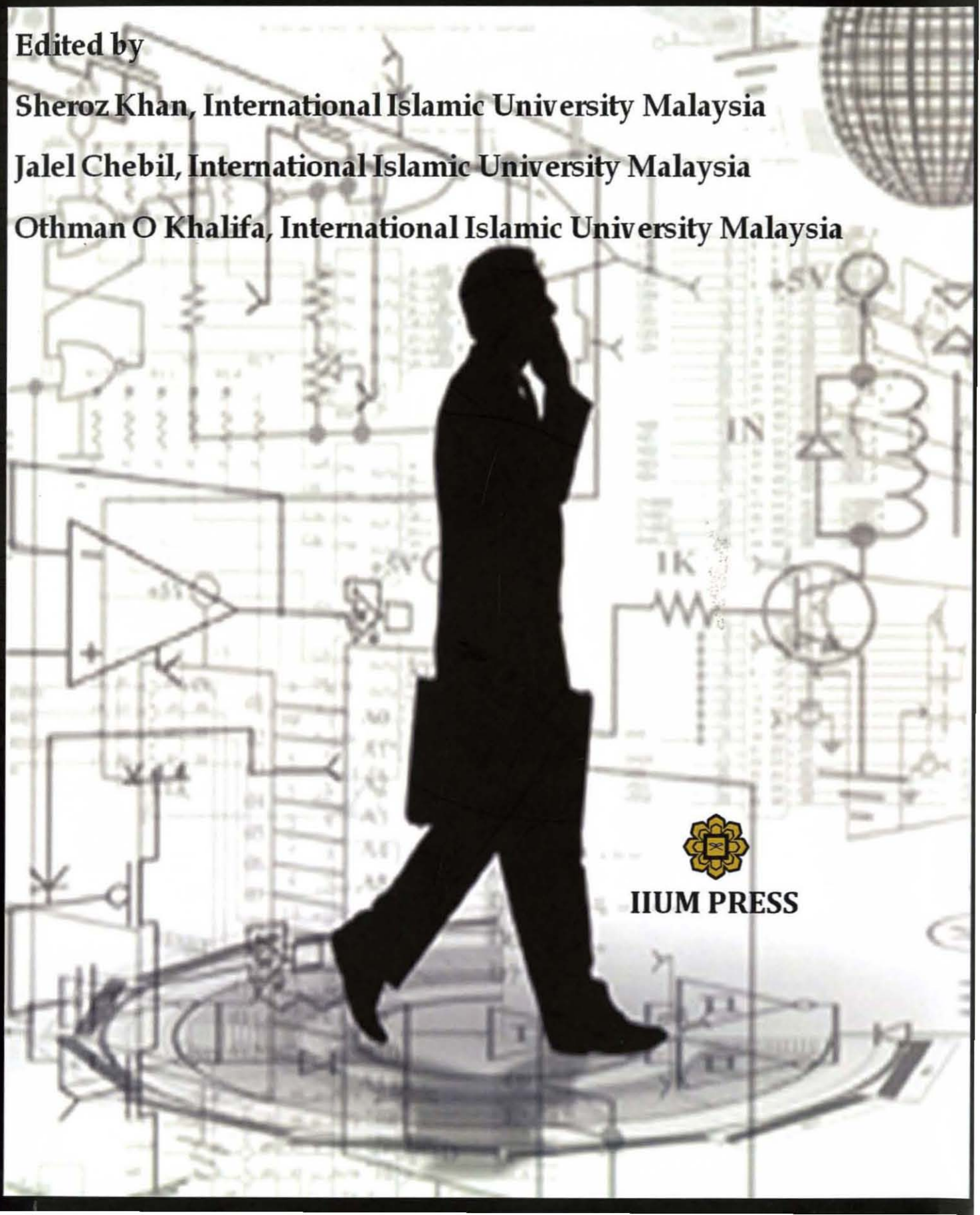
PRINCIPLES OF TRANSDUCER DEVICES AND COMPONENTS

Edited by

Sheroz Khan, International Islamic University Malaysia

Jalel Chebil, International Islamic University Malaysia

Othman O Khalifa, International Islamic University Malaysia



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Selangor Darul Ehsan
Tel: +603-6188 1542 / 44 / 45 Fax: +603-6188 1543
EMAIL: iiumprinting@yahoo.com

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Chapter 3

RLC CIRCUIT RESPONSE

RUMANA TASNIM, ATIKA ARSHAD, SHEROZ KHAN, MUSSE MOHAMOD

3.0 INTRODUCTION

The three basic circuit elements namely resistor (R), inductor (L) and capacitor are known to be passive discrete elements which are used as electronic components in signal conditioning and processing. An inductor or capacitor is an energy storage device. Capacitor's current or an inductor's voltage does not change instantaneously. Ideally speaking, an uncharged capacitor offers zero resistance at the instant of time when a voltage is applied; however it shows more and more resistance to reach an infinite resistance value when it is fully charged. Analogously speaking, an un-magnetized inductor has got very high value of resistance in the beginning at the instant in time when a voltage source is applied, hence having zero current. The inductor reaches to have zero resistance, allowing full current to flow when it is fully magnetized. Also, both components do not dissipate power; rather power is stored and delivered. RLC circuit is a widely used as resonant circuit in electronics which consists of resistors and the equivalent of two energy storage elements. RLC circuit can also be referred to as second-order circuit as it is characterized by second-order differential equation.

3.1 SERIES AND PARALLEL RLC CIRCUIT

The natural response of a series RLC circuit leads to calculating the current in the series-connected elements which arises owing to the release of stored energy in the inductor or capacitor or both when such components are closed in the form of a circuit as shown in Fig.3.1.

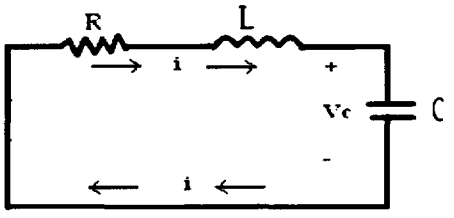

Fig.3.1: Natural Response of RLC Series Circuit