PRINCIPLES OF TRANSDUCER DEVICES AND COMPONENTS

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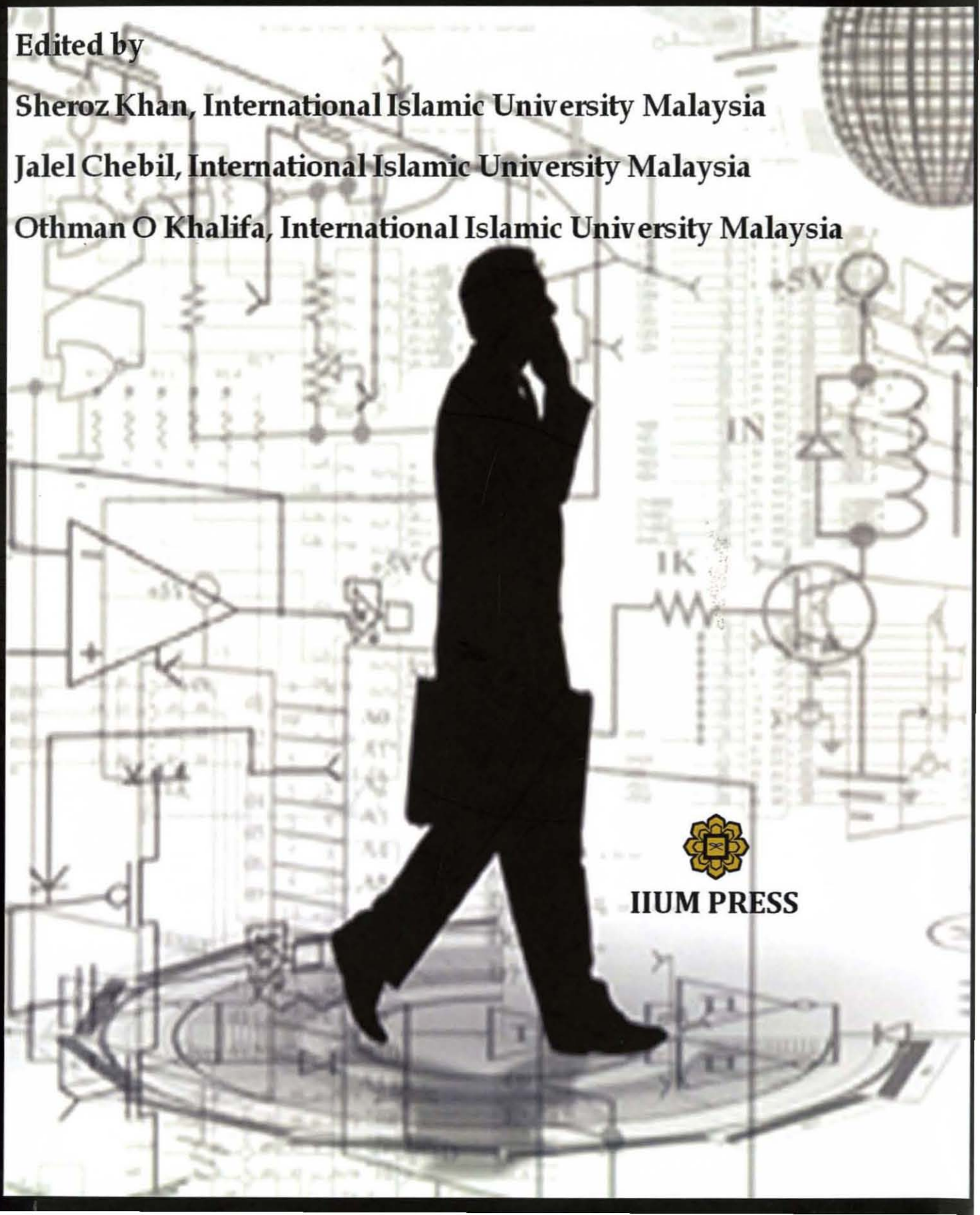

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CONTENTS

Chapter 14

SPIKES BLOCKING AND SURGE PROTECTION

AHMAD LUTFI TORLA, SHEROZ KHAN, ASAN GANI

14.0 INTRODUCTION

In order to ensure a constant voltage source, we employ line regulation, load regulation and ripple rejection. These are often small deviations in the input voltage. A spike or surge is a sudden large deviation in the circuit that usually only lasts for a very short period of time, for example lightning surges. This characteristic means that regulator circuits designed for line regulation and ripple rejection may not be able to handle the large load of a surge and may not be able to respond fast enough to make any meaningful difference [1]. Spikes are extremely damaging to a circuit since the voltage of a spike such as a lightning surge can be thousands of times the intended voltage of the circuit [2].

14.1 SPIKES BLOCKING

14.1.1 Response Blocking

Unfortunately, like any electronic components or circuits, surge protectors don't respond instantly. The longer the response time, the longer the circuit is exposed to the surge voltage. Fortunately, surges also do not occur instantaneously. They take a few microseconds to reach peak voltage [2]. Therefore, a spike blocker should be designed to respond within a few nanoseconds in order to limit the spike as much as possible and to reduce damage to the circuit.

14.1.2 Clamping Voltage

The circuits designed to maintain constant voltage usually have a limited operating range [3]. As voltage increases or decreases, the circuit reduces or increases the current accordingly to reflect the power drawn by the circuit. If the input voltage spikes too high, it can go beyond the ability of the circuit to regulate. That voltage is known as the clamping voltage. It is the maximum voltage that a circuit can operate at before its behavioral characteristics breaking down.