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Coupling Control in Coupled Microstrip Lines Using Defected Microstrip Structure

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ABSTRACT—this paper proposes a simple approach for achieving the desirable coupling in coupled microstrip lines using defected microstrip structure (DMS) with a constant space between two lines. DMS creates a reject band, so firstly the S-parameters of the transmission line are obtained using a full wave electromagnetic simulator in order to determine stopband location and proper frequency region for control coupling. Then by the suitable assuming according to specified criteria and analytical formulations, dimensions of proper DMS are calculated. Results have been verified by simulations and fabrication.

Keywords: Coupled Microstrip Lines, Defected Microstrip Structure (DMS), Coupling.

I. INTRODUCTION

Coupled transmission lines are ubiquitous in most of microwave circuits. A vast amount of studies on these structures exist in literatures [1-4]. In some of applications, such as coupled line couplers, the coupling effect is desirable, but designing a coupled line couplers with special coupling in particular frequency is difficult, due to spatial constraints of board. By making the slot on the microstrip that is called DMS [5-7] these constraints can be solved.

Making a defect on the circuit can be used in designing filters, dividers, amplifiers, etc. This defect creates resonance characteristics in the frequency response. So, this effect can be widely used in devices such as microstrip filters or antennas [5-10].But in this paper another attribute has been considered. That is the ability of DMS to control of coupling.

As shown in Fig.1, two methods for controlling the coupling of coupled line couplers have been presented. The first method is based on changing the space between lines of coupled line coupler that is not efficient or proper action in many applications. The second method is based on using DMS. This method is a novel and simple approach for controlling the coupling by changing the dimensions of DMS in particular frequencies.

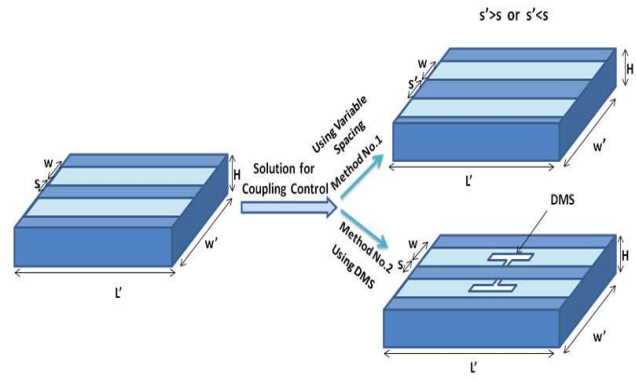

Fig. **1** Coupling control methods in coupled line coupler with constant length.