

IMPACT OF DISTRIBUTED GENERATION (DG) ON POWER SYSTEM TRANSIENT STABILITY

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“May Allah S.W.T bless all”

-AMIN-

ABSTRACT

Transient stability is an important subject in power system stability. This is due to the fact that the nature of disturbance is mainly in transient. The ability of a power system to survive the transition following a large disturbances and reach an acceptable operating condition is called transient stability. This thesis presents the impact of Distributed Generation (DG) implementation on transmission system transient stability. The impedance in between the DG and transmission network will be affected by connection of the system. At high load penetration level, the transmission system transient stability may influence in case of an unstable. The weaker or a stronger grid connection than other implementations can be simulated by using MATLAB/Simulink model. Heuristic test was performed at 10-bus system and results are demonstrated.

Index Terms—Distributed Generation (DG), connection strength, power system transient stability.

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CHAPTER 1

INTRODUCTION

1.1 Introduction

Distributed Generation (DG) units such as the photovoltaic generation, wind turbine generation, fuel cell generation, gas turbine generation and etc. operate in parallel with the power distribution system. This parallel operation of a dispersed generation unit with the utility distribution system may bring about some critical problems that are difficulties and complications for the reliable and safe operation of both systems [1]. Basically, the layout of a distribution network is corresponding to the particular geographical and customer situation [2]. There are many ways to connect DG to the distribution network seen as the 3 DG units are connected to the end of one lateral, the 3 DG units are connected to the first substation and the last one is 3 DG units connected at the end of the three different laterals (in parallel). The weaker or a stronger grid connection than other implementations depends on the way of connection DG to the distribution network.

The distribution system carries power to individual customers, in a certain geographical area. Both the geographical situation and the distribution of customers can vary from one area to another, which makes the layout of a distribution network different from those of other ones (corresponding to the particular geographical and customer situations) [3]. Disturbance subjected to the system will be simulated and transient stability is evaluated. Consequently, the impact of DG on the transient stability is identified in the attempt of reducing transient stability. There are three layout of a distribution network with a radial structure [4]. All the comparison of connection may illustrate an actual situation where DG may be implemented in a distribution network with relatively high impedance and low impedance. The system transient stability is affected differently with respect to the penetration level, the DG technology and the fault