

Feasibility of an FDM System Using Mach-Zehnder Filters in a Smart Grid

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Abstract— The present paper describes the feasibility of the FDM system using Mach-Zehnder filters for a power control system in a smart grid where a digital grid cell system is used. The interconnection of large quantities of the distributed power sources, such as PV power sources, to the current bulk power grids is anticipated, and as a result, fluctuations of voltage and frequency will increase and make the adjustment of the power demand-supply balance difficult. By applying information communication technology to a power supply system in order to control the digital grid, energy-savings, and a stable power supply, the widespread use of renewable energy is expected. The digital grid cell includes numerous consumers, such as houses, office buildings and factories, which may or may not have PV power sources. The proposed FDM system will enable the processing of a great deal of information to be exchanged incoherently between consumers and power generators, because the FDM system has the capability of 2^N transmission channels, and operates incoherently every channel, and the transfer functions of which can be expressed as the basis of the plain representation of the transfer function of the Mach-Zehnder filter. Using the FDM system, it will be possible to control a power supply system in a smart grid in order to maintain a stable power supply, energy savings, and a suitable adjustment of the power demand-supply balance.

Keyword—FDM, Mach-Zehnder filter, Smart Grid, Digital grid cell, PV power generator



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