Transmission lines modeling based on vector fitting algorithm and rlc active/passive filter design

ABSTRACT

In the modeling of the transmission line, the electric energy produced at generating stations is transported over highvoltage transmission lines to utilization points, and the trend toward higher voltages is motivated by the increased line capacity while reducing line losses per unit of power transmitted. An electric transmission line is modeled using series resistance, series inductance, shunt capacitance, and shunt conductance. For some studies, it is possible to omit the shunt capacitance and conductance and thus simplify the equivalent circuit considerably. Frequency Response Analysis (FRA) on the transmission line application is utilized for behavior prediction and fault diagnosis, but a need for more investigation is important for the bases on which the diagnosis determined. The utilities of the measured FRA data points need to be enhanced with suitable or developed modeling category to facilitate the modeling and analysis process. This research proposes a new method for modeling the transmission line based on a rational approximation function which can be extracted through the Vector Fitting (VF) method, which attempts on the frequency response measured data points. A set of steps needs to be implemented to achieve this by setting up the extracted partial fraction approximation, which results from a least square RMS error via VF, in such a way that would construct as real numbers, first and second order parts as well as the gain constant. Active and passive filter design circuits are attempting to construct the model of that rational function of the transmission line. RLC design representation has been implemented for modeling physically the system with MATLAB, Simulink for verifying the results.

Keyword: Transmission lines modelling; Vector fitting method