

Triangular Matrix Formulation for Power Flow Analysis in Radial DC Resistive Grids With CPLs

Abstract

This brief briefly addresses the problem of power flow solution for direct-current (dc) networks with radial configuration and constant power loads (CPLs). It proposes a novel iterative method based on the upper triangular relationship between nodal and branch currents, it also uses a primitive impedance matrix. The main advantage of this method lies in the possibility of avoiding inversions of non-diagonal matrices, which allows its convergence to be improved in terms of the number of iterations and processing times required in comparison to classical admittance-based methods. Three different radial dc resistive networks composed by 21, 33, and 69 nodes are employed to validate the effectiveness of the proposed power flow solution method. For comparison purposes, the Newton-Raphson method, and also successive approximations and Taylor-based approaches are implemented. All simulations have performed in MATLAB software.