Power flow problem approached by geometric algebra

Nitin Sundriyal[1] and Juan Ramirez[1]

[1]Centre for Research and Advanced Studies Unit Monterrey

July 3, 2023

Abstract

Analysing the electrical power systems' behaviour is significantly based on power flow analysis. This paper uses a geometric algebra (GA) mathematical framework to solve the power flow problem. It can combine and extend algebraic and geometric concepts in a unified and powerful way. While complex numbers are an extension of the real number field, geometric algebra builds on the ideas of linear algebra and geometry to provide a more complete and versatile mathematical framework. Additionally, GA enables handling multivectors through geometric functions, including wedge and geometric products. Thus, it allows a straightforward interpretation because of its ability to abstract the formulation. Therefore, by utilising GA, power flow analysis may be performed efficiently and precisely, resulting in improved design and operation of power systems. This paper presents the GA-based formulation and shows the comparative results between the conventional and the proposed technique.

Hosted file

nitin_Powerflow_Jun2023.docx available at https://authorea.com/users/459332/articles/652328-power-flow-problem-approached-by-geometric-algebra