

INVESTIGATION OF THE ACCURACY OF GROVER'S METHOD
WHEN SOLVING FOR THE MUTUAL INDUCTANCE OF
TWO SINGLE-LAYER COAXIAL COILS

Stacy Rohe

Dr. Thomas G. Engel, Thesis Supervisor

ABSTRACT

In 1933 Grover introduced a convenient method of calculating the mutual inductance between two single-layer coaxial coils that is still widely accepted as the standard today. He produced tables of numeric values from Clem's series formula and used them in a single equation to calculate the mutual inductance. In this investigation, the accuracy of Grover's method is presented and discussed. Using the same geometries, examples from Grover's literature are compared to answers acquired using a field code software and the direct calculations of elliptical integrals. Also by fixing various dimensional parameters while varying others, practical interest geometries such as equal radii, equal lengths, different radii, different lengths, and different separation distance between the coils are achieved. The mutual inductances are found and compared for Grover's method, the field code method, and direct elliptical integral calculation. The maximum percent error found when comparing Grover's method to the field code method was 1.0715% and 9.799% for the literature and varying parameter examples respectively. While the maximum percent error found when comparing Grover's method to the direct calculation of the elliptical integrals was 98.87% and 58.92% for the literature and varying parameter examples respectively. Thus, Grover's method compares more favorability to the field code method over the direct elliptical integral calculation method.