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

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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.