Initial Magnetic Field Distribution Around High Rectangular Bus Bars Grigore A. Cividjian 1

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Abstract: The one-dimensional transient electromagnetic field in and around a
system of two nonmagnetic homogenous rectangular high thin bars can be
analytically evaluated if the ratio of average initial magnetic field on the two
sides of thin bar, or of the ratio of initial magnetic fields in middle of the bar
height is known. In this paper, using appropriate conformal mappings, an exact
analytical solution for these ratios are proposed in the case of very thin bars.
Obtained values are compared with FEM results for relatively thick bars.
Keywords: Conform mapping, Initial magnetic field, Elliptic integrals.

Introduction

The problem of transient electromagnetic fields for a system of two
infinite-high and long non-magnetic bars in cases of current and voltage step
application is completely studied and brilliantly solved in [1], considering the
magnetic field on internal side of the bars constant and

evenly distributed and
on the external side of the bars equal to zero.