Helicoidal Single-Layer Cylindrical Coil Self-Inductance Evaluation: A Didactic Method

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***Index Terms*—Biot–Savart Law, cylindrical coils, self-inductance calculations.**

I. Summary

This paper presents a didactic mathematical method to evaluate the self-inductance of a nonmagnetic core single-layer cylindrical and helicoidal coil presenting voids between turns. This type of calculation, using Biot–Savart Law, is not usually presented in the traditional electromagnetic text books, but constitutes an excellent tool to show to the students how to apply the very important Biot–Savart Law, using vectorial calculus, in a special electromagnetic device. It also shows them that the results are more accurate than that gotten when using the traditional methods presented in the most adopted books, that don't consider the helicoidal shape and the voids between turns and usually make strong restrictive conditions to permit the self-inductance calculation.

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