

Electromagnetic Analysis of Composite-Material-Embedded Chiral Cylindrical Shells

蕭堯文、許崇宜；邱政男

E-mail: 9315073@mail.dyu.edu.tw

ABSTRACT

In this thesis, electromagnetic shielding and scattering properties of a composite-material-embedded chiral cylindrical shell impinged by a normally incident plane wave are investigated. The chiral material under consideration is isotropic and reciprocal, and is artificial in nature. The fiber-reinforced composite material is anisotropic and has many superior properties, such as sufficient hardness and light weight. The electromagnetic fields in each chiral layer are expanded in terms of appropriate cylindrical wave functions. The unknown coefficients for all chiral layers can be related in a recursive manner. The fields in composite material can be solved using a finite-difference approach. After enforcing the boundary conditions at the interfaces between the chiral material and the composite material, the scattering and shielding characteristics can be obtained. Numerical computations on echo widths and shielding effectivenesses for various structural parameters have been carried out.

Keywords : chiral material ; composite material ; echo width ; shielding effectiveness

Table of Contents

目錄 封面內頁 簽名頁 授權書.....	iii	中文摘要.....	iv
iv 英文摘要.....	v	誌謝.....	vi
vi 目錄.....	vii	圖目錄.....	x
x 表目錄.....	xiv	第一章 緒論.....	1
1 1.1研究動機與文獻探討.....	1	1.2研究方法.....	3
3 1.3章節概要.....	3	第二章 旋光性介質之介紹.....	5
5 2.1旋光性介質的簡介.....	5	2.2基本結構的關係式.....	5
5 第三章 複合材料的基本特性.....	9	3.1複合材料的定義.....	9
9 3.2複合材料的分類.....	10	3.3各類纖維強化樹脂複合材料的探討.....	11
11 3.3.1玻璃纖維 - 樹脂複合材料.....	12	3.3.2碳纖維 - 樹脂複合材料.....	12
12 3.3.3硼纖維 - 樹脂複合材料.....	13	3.3.4石墨複合材料.....	13
13 3.3.5碳化矽纖維 - 樹脂複合材料.....	14	3.3.6混雜纖維強化複合材料.....	14
14 3.4基體材料.....	15	3.4.1陶瓷基材.....	15
15 3.4.2聚合體基材.....	15	3.4.3金屬基材.....	16
16 第四章 複合材料與旋光性介質之理論推導.....	19	4.1建構複材區域之微分方程式.....	19
19 4.2建構旋光性介質之方程式.....	24	4.3建構各層間之關係式.....	24
24 第五章 數值模擬結果分析.....	26	5.1電磁波之散射特性.....	29
29 5.2電磁波之屏蔽效應.....	48	第六章 結論.....	52
52 參考文獻.....	53	附錄A 無損耗且互易性之旋光性介質.....	55
55 附錄 B Bohren分解.....	57	附錄 C 特徵函數的展開.....	59
59 附錄 D 多層結構之間的關係式.....	61	附錄E 最內層結構之關係式.....	63
63 附錄 F 區域2最內層之場量關係式.....	66	附錄G 複材介質之矩陣表示式.....	70
70 附錄H 複材與旋光性介質介面處之場量關係.....	73	附錄 I 區域2第一層之場量係數.....	74

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