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圓柱形導體對平面電磁波的散射

Scattering of a Plane Electromagnetic Wave by a Conducting Cylinder

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摘　要：我們研究了平面、簡諧電磁波被一個完美的導體圓柱散射的課題。我們從馬克士威方程出發，然後獲得了電場 **E** 和磁場 **B** 的運動方程，同時我們亦得到了電場 **E** 和磁場 **B** 的關係。使用分離變數的技巧，在圓柱對稱情況下，電場 **E** 和磁場 **B** 的一般解被獲得。一般解中的係數經由導體柱表面的邊界條件－在 $\rho = a$ 時 $E_z = 0$ 和 $E_\rho = 0$－決定。入射電磁波被分爲兩類：一種是沿 z 軸被極化稱爲 E 型波；另一種是垂直於 z 軸被極化稱爲 H 型波，我們分別處理它們。導體柱上的感應電流密度被計算出來，我們也計算出這個圓柱體的散射截面積和微分散射截面積。在低頻極限時，E 型波有更多的散射截面積；H 型波則正好相反。

關鍵詞：電磁波、散射、柱形、漢克函數、貝塞函數

Abstract: The scattering of plane, harmonic electromagnetic waves from a perfectly conducting cylinder is studied. We start from Maxwell's equations, then the equations of motion of electric field **E** and magnetic field **B** are obtained. At the same time the relations between **E** and **B** are acquired. Using separation of variables technique the general solutions of **E** and **B** fields under cylindrical symmetry are obtained. The coefficients in the general solutions are determined by the boundary condition of the surface of the conducting cylinder, $E_z = 0$ and $E_\rho = 0$ at $\rho = a$. The incident plane waves are divided into two types. One polarized along z direction is called E-type. The other polarized transversely to z is called H-type. They are treated separately. The induced current density on the surface of the conducting cylinder has been calculated. The scattering cross

section and differential scattering cross section of the cylinder are calculated, too. We find that there are more scattering cross section when the E-type wave is incident at low frequency limit, the H-type wave is the opposite.

Keywords: Electromagnetic Waves, Scattering, Cylinder, Hankel Function, Bessel Function

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航照影像之改良式增顯技術研究

A Study of Improved Enhancement Method for Aerial Imagery

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摘　要：航拍相機經過多層透鏡接收地面反射之光線，其間經常會受到雲霧或聚光燈效應之影響，導致影像品質不佳，進而造成判讀或製圖的阻礙。常見阻礙判讀的情況在於影像灰階值過於集中，無法平均分佈，故影像於螢幕顯示時，未能將應有之動態範圍(Dynamic Range)充分顯示出來。目前雖有許多學者提出各式影像增顯演算法，來解決某些特定或局部的問題，然而，一張以 1800dpi 光學解析度掃瞄之航照影像，其檔案大小約在 800MB 左右，因此，當執行一些演算法時經常面臨處理時間過久之問題。爲加強增顯效能，本研究嘗試改進 Retinex 增顯演算法之運算效率。我們在離散餘弦轉換之頻率域上進行模糊運算增進執行效能；並使用直方圖高斯化(Histogram Determination)以及色彩補償法(Color Restoration)增進色彩表現。由實驗結果得知本研究方法可大幅降低影像增顯之執行時間，且於影像色彩與飽和度之呈現均優於單尺度視網膜演算法(SSR, Single-Scale Retinex)與多尺度視網膜演算法(MSR, Multi-Scale Retinex)。

關鍵詞：航照影像、影像增顯、Retinex 演算法、離散餘弦轉換

Abstract: Through the aerial sensor, the light is always reflected from ground and received from multi-lens during the effect of cloud, mist, and spotlight. This is one of reasons causing the unacceptable image quality, and the resistance of interpretation-and-mapping. The most of resistance of interpretation-and-mapping conditions is the distribution of concentrated gray pixel values. Therefore, the dynamic rage cannot be show fully when the image is showed in the monitor.

Recently, there have been many studies for image enhancement algorithms, and solved some problems. But, the storage of aerial photo scanned with 1800 dpi is usually about 800 MB. So, the process time is being considered while the algorithms are executed. For improving the efficiency of imagery enhancement, this study tried to improve the executed complexity problem of Retinex algorithm. We execute the blured computation in Discrete Cosine Transform (DCT) frequency domain to improve execution time, and use histogram determination and color restoration to improve color display. From the experiment results, our proposed algorithm can reduce execution time substantially, and the performance in imagery color and saturation are better than SSR (Single-Scale Retinex) and MSR (Multi-Scale Retinex) algorithm.

Keywords: Aerial Imagery, Imagery Enhancement, Retinex Algorithm, Discrete Cosine Transform

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配位錯合物{[Pr(μ$_2$-H$_2$O)$_6$(H$_2$O)$_3$]·3NO$_3$}$_\infty$ 合成與結構分析

Synthesis and Crystal Structure of {[Pr(μ$_2$-H$_2$O)$_6$(H$_2$O)$_3$]·3NO$_3$}$_\infty$ Complex

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摘 要:利用水熱合成反應,得到配位錯合物**{[Pr(μ$_2$-H$_2$O)$_6$(H$_2$O)$_3$]·3NO$_3$}$_\infty$** (**1**)，經 X-Ray 晶體繞射方法測定結果顯示，錯合物 **1** 屬三方晶系(**trigonal**)，空間群爲 *R* 3 m (no. 160)， *a* =10.6137(9) Å, *c* = 4.0770(7) Å, V = 397.75(8) Å^3, Z = 3, D$_c$ = 3.795 g/cm^3, S = 1.294, λ(M$_0$K$_\alpha$) = 0.71073, F(000) = 447, R1 = 0.0204 & wR2 = 0.0529。晶體結構顯示錯合物 **1** 含有 **H$_2$O** 的橋鍵(**μ$_2$-η^1**)配位基，每個 **Pr(Ⅲ)** 離子配位九個 **H$_2$O** 分子，形成三帽三角菱柱結構，六個對稱 **H$_2$O** 配位基在三角菱柱頂點，而其餘三個 **H$_2$O** 離子則位在菱柱長方形外，**Pr(Ⅲ)** 離子位於中心。由於分子間氫鍵作用力(**O-H---O**)，此晶體自組裝成三維(**3-D**)無限延伸的立體結構。

關鍵詞：水熱反應、氫鍵、自組裝、鐠金屬

Abstract: The title complex **{[Pr(μ$_2$-H$_2$O)$_6$(H$_2$O)$_3$] · 3NO$_3$}$_\infty$** (**1**) has been synthesized via hydrothermal reaction and be characterized by X-ray diffraction. The crystal belongs to trigonal,

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space group *R* 3 m (no. 160) ，*a* =10.6137(9) Å, *c* = 4.0770(7) Å, V = 397.75(8) $Å^3$, Z = 3, D_c = 3.795 g/cm^3, S = 1.294, λ (M_0K_α) = 0.71073, F(000) = 447, R1 = 0.0204 & wR2 = 0.0529. The crystal structure shows that **Pr (Ⅲ)** ion is coordinated with six H_2O molecules bridges (**μ_2-η^1**) and three H_2O molecules, forming a tricapped trigonal-prismatic geometry. The six symmetry-equivalent prismatic H_2O ligands define the vertices of the trigonal prism. The three capping H_2O ligands are positioned outside the rectangular faces of the prism. The **Pr (Ⅲ)** ion is in the center. The three-dimensional (**3-D)** crystal structure is stabilized by hydrogen-bonding interaction.

Key words: Hydrothermal Reaction, Hydrogen bonding, Self-assembly, Praseodymium

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以分光光度計法測定免洗筷中硫酸根離子殘留量研究

Determination of Sulfate Residues in Disposable Chopsticks by Spectrophotometer

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摘 要：在適當的酸性條件下，以分光光度計於波長 **420 nm** 測定硫酸根離子的含量。比較下較簡便不加懸浮試劑的測定方法及傳統加懸浮試劑測定的方法，不加懸浮試劑的簡易測定方法，硫酸根離子在 **0～4000 μg/g** 範圍內，檢量線線性甚佳，在 **0.020～0.60 N HCl** 酸度下不受干擾**(R^2 = 0.998)**，其精密度與準確度均佳。分析過程不繁複(不需添加懸浮試劑)及減少環境污染的優點。硫酸根過去商業上常用於肥料的使用，也廣泛使用在免洗筷與地下水當作殺虫與殺真菌的藥劑。而台灣地區每年免洗筷的使用量超過 30 億雙，數量相當龐大。因此，

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免洗筷中硫酸根離子殘留狀況探討是是一項相當重要的議題。硫酸根主要的健康效應是會造成食用者消化系統的不適與病變，包括下痢與腸胃炎。本研究抽樣 **20** 種市售品牌與兩種型態的免洗筷(單生筷與雙生筷)，利用簡易標準曲線法(分光光度計)，進行偵測殘留的硫酸根離子濃度分布。結果顯示單生筷與雙生筷硫酸根的殘留濃度範圍分別爲 **830-5873 μg/g** ，**694-2058 μg/g**。

關鍵詞：免洗筷、公共衛生、硫酸根、殘留量

Abstract: In appropriate acid condition, we use UV-Vis spectrophotometer to study the contents of standard sulfate ion at **420 nm**. Compare the simpler method (without any suspension reagent) and traditional method (add suspension reagent), there is no apparent difference when sulfate ion between 0～4000 **μg/g** .Its inference is very excellent. There is no interference at 0.020～0.60 N HCl **(R^2= 0.998)**. The results present good precision and accuracy. This method is simpler and no pollution to environment.

Taiwanese use over 30 billion pairs of disposable chopsticks every year. Sulfate in commercial uses are primarily in fertilizers, but it is also widely used in disposable chopsticks, gunpowder, insecticides and fungicides. Sulfate residues of disposable chopsticks are an important public health issue. The health effect observed following sulfate ingestion are laxative action, diarrhea and enterogastritis. In this study, we detect **20** commercial brands, and two types of disposable chopsticks (single pair and coupled sets). The distribution of sulfate residues are **830-5873 μg/g**, **694-2058 μg/g** for single pair, coupled sets, respective.

Keywords: Disposable chopsticks, Public health, Sulfate, Residues

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商末紀年、祭祀類甲骨研究

The Study of the Calendar System and Sacrificed Oracle Bone Inscriptions in the Chinese Late Shang Dynasty

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摘 要：本文藉助學界之研究成果，重新探討商末之際，紀年方式、祭祀制度，進而釐清詞彙使用之相承、變異性。首先，藉助紀年方式探討，發現殷商末年隨著「周祭制度」完備，至帝辛時期，甲骨文產生新紀年體例，即「隹（唯）王幾祀」之句型，此種紀年方式不僅出現殷墟甲骨文，更存在晚商金文。其次，董理殷墟第四、五期甲骨文中十七項祭祀，加以區別：「特定祭祀」、「商周祭祀相承」、「商代祭祀之相承與變異」、「祭祀之斷代」四大類。總之，透過上述研究可證明晚商 273 年間雖隸屬相同祭祀，會因時間不同，遂造成歧異部分，藉此以探討乙丁、乙辛時期祭祀制度之演變。

關鍵詞：甲骨文、紀年類、祭祀類、斷代

Abstract: In this article, we discuss the calendar system and the ceremonies of sacrificed in the Chinese Late Shang dynasty and deduce the origins and the transformations of characters.From the literatures of calendar system, the ceremonies of Zhou Ji have developed. In the period of Di Xin, the new sentence form “wei wang ji si” of calendar system was found in the oracle bone inscriptions. This form can also be found in the Bronze Inscriptions of Late Shang dynasty.Furthermore, the seventeen ceremonies of the sacrificed inscriptions on the fourth and fifth period oracle bone of the Shang dynasty can be classified to four types, special ceremonies,

systems of Zhou dynasty adopted from Shang dynasty, the different and unity of systems of Shang dynasty, periods classified by the sacrificed ceremonies.The sacrificed ceremonies were basically the same type over the period of 273 years in late Shang dynasty. At different period, some changes can be found and we discuss the transformation of sacrificed ceremonies of the period of yi-ding and yi-xin.

Keywords: Oracle bone inscriptions**,** Sacrificed ceremonies**,** Periodic classification