

國立交通大學
光電工程研究所
碩士論文

平面金屬次波長微孔應用於光學讀寫頭之
近場研究

**Study of Near-Field of Planar Metallic Aperture
Applied to Optical Pickup via FDTD**



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中華民國九十三年六月

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中文摘要

平面金屬次波長微孔可被利用於讀寫頭中以克服繞涉極限達到縮小光點的目的。可是傳統的方型微孔的光穿透效率很低。我們利用光束傳播法和有限時域差分法來模擬整個光學讀取頭，進而研究c型微孔跟方形孔的出光場包括光穿透效率，最大電場強度跟光點大小。當在相似的近場光點大小下，C型微孔提供的光穿透效率約為方型微孔的一千倍。

我們也考量金屬特性且進行c型孔尺寸的最佳化，而我們利用聚焦式離子束顯微鏡(Focused Ion Beam)來做製程且利用近場掃描式光學顯微鏡(Near-Field Scanning optical Microscopy)進行觀察出光。

Optical fiber based pickup module for Near-field recording

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Optical resolution beyond the optical diffraction limit can be achieved by use of nano metallic aperture in a near-field system. The metallic aperture was utilized in fiber-based integrated optical pickup system to sustain the spatial resolution as the spot size was determined by the nano metallic aperture. However the problem encountered of conventional aperture was the extremely low power throughput.

In this thesis, the properties of the field distribution from the square and C-shaped apertures were be characterized and the C-shaped aperture was found to provide 3 order of magnitude more power throughput than square aperture under the condition that perfect conductor with negligible thickness was assumed. The characteristic features of metal were taken into consideration for real case. The fabrication of the aperture was carried out by FIB and the measurement

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即將離開學校的前夕，以這篇致謝做最後的尾結。

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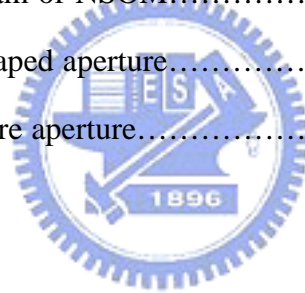


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