基地台中天線排列方式對多載波分碼展頻近接系統於衰落環境中之研究與策略

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摘 要

本研究論文中，針對以正交分頻多工(orthogonal frequency division multiplexing, OFDM)原理為技術背景之多載波分碼多工近接 (multi-carrier coded-division multiple-access, MC-CDMA)系統進行研究與分析，其中MC-CDMA所運作之工作環境，假設處於因不同方式之接收天線的排列，所形成之接收分支間存在著分支相關(branch correlation)特性時；本文中接收天線的排列方式考慮為線性排列、三角排列與環狀排列三種不同的天線排列形式；另外，除了分支間相關特性之參數外，分支之信號強度假設各以具有相關性Nakagami-m統計分布之頻選性(frequency selective)衰落通道加以呈現；再於最大比率合成(maximum ratio combining, MRC)分集接收端進行求取之訊雜比(signal-to-noise ratio, SNR)和使用者對位元錯誤率(bit error rate, BER)的關係之推導，最後提出分析MC-CDMA系統效能之計算過程與完全式。 為能更真實的應用在現實的工作環境，將採用相關Nakagami-m統計分布之衰落通道。再者，MC-CDMA系統之接收機制以最大比例合成分集，對其系統中進行平均位元錯誤率(bit error rate, BER)效能分析之公式推導，為免除公式之複雜性，於是透過補誤差函數(complementary error function)的間接方式推導出來一種完全式。本文中，不僅在數值分析裡討論天線三角排列、線性排列和環狀排列對系統效能的影響外，而且天線分支相關性也一併列入分析。一般而言，MC-CDMA系統存在著接收分支數目越多，多重存取的系統效能就會較佳。而另一個有趣的討論，係對照天線外觀做輕微的變動時，系統的效能也會因此而降低。此論文之分析結果，得以提供給MC-CDMA系統之學術與理論設計時之重要依循。

關鍵詞 : 環狀天線排列、線性天線排列、多載波分碼展頻多重存取系統、最大比例合成、Nakagami-m衰落通道、三角天線排列、指數多路徑強度

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