

應用於離散多載波傳收器之低複雜度時域等化器

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中文摘要

在離散多頻帶 (discrete multitone, DMT) 接收器中，使用了一個時域等化器 (time-domain equalizer, TEQ) 來縮短通道響應。然而，並非所有的TEQ 設計方法都是著重於想使傳輸速率變大。近年來，有些學者已注意到這個問題也提出了解決這個問題的方法。現今有一個方法即是Minimum intersymbol interference (Min-ISI)。這方法可以使DMT系統的傳輸速率接近通道最大傳輸速率。然而這方法的缺點是必須耗費相當多的乘法，這在實際上的即時處理器是不易實現的。因此，我們希望能改進其為一個低複雜度的方法。在本論文中，我們將要研究這個問題，並提出兩個簡化的演算法。在最後的模擬中，我們可以發現簡化方法所得到的傳輸率與原來的 Minimum intersymbol interference (Min-ISI) 相差並不遠。

Reduced Complexity Time-Domain Equalization Methods for Discrete Multitone Transceivers

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Abstract

In the discrete multitone (DMT) receiver, a time-domain equalizer (TEQ) is used to shorten the channel response. However, not all of the existing TEQ design methods aim at maximizing bit rates. The minimum intersymbol interference (Min-ISI) method yields TEQ designs for DMT modulation transceivers that are close to channel capacity. For eight standard ADSL channels, the Min-ISI design method reaches within 2% of the matched filter bound at the TEQ output. However, the Min-ISI method relies on several computationally expensive multiplications. In this thesis, we develop low-complexity TEQ design algorithms for these multiplications to allow for real-time implementation of the Min-ISI method on programmable digital signal processors. Based on simulations using eight different carrier-serving-area loop channels, we can show that the two proposed modified methods yield high bit rates. Its performance is very close to the original Min-ISI design method.

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