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Chien-Cheng Tseng, Su-Ling Lee

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On the Reconstruction of Derivative Sampling Method of Band-Limited Signal

Chien-Cheng Tseng[1] tcc@nkfust.edu.tw

Su-Ling Lee[2] lilee@mail.cjcu.edu.tw

1. Department of Computer and Communication Engineering, National Kaohsiung First University of Science and Technology, Kaohsiung, Taiwan
2. Department of Computer Science and Information Engineering, Chang Jung Christian University, Tainan, Taiwan

Corresponding author: Chien-Cheng Tseng
Telephone: 886-7-6011000 ext 2029
Fax: 886-7-6011012

Abstract

In this paper, the reconstruction methods of the derivative sampling methods of bandlimited signals are presented. First, the conventional Nyquist uniform sampling method and the derivative sampling method are reviewed briefly. Then, the reconstruction filters are designed by converting the analog filter bank structure in derivative sampling method to an equivalent discrete-time filter bank structure preceded by Nyquist uniform sampling and followed by impulse modulation and lowpass filtering. Next, the first-order derivative sampling method is extended to fractional-order derivative sampling method and the designs of its reconstruction filter bank are also studied. To reduce the implementation complexity, the orthogonal matching pursuit method is used to design the sparse digital filter bank in the proposed reconstruction structure. Finally, some numerical examples are used to show the effectiveness of the proposed reconstruction methods of the derivative sampling schemes.

Keywords：Uniform sampling, Derivative sampling, Filter bank, Fractional-order derivative sampling, Orthogonal matching pursuit