

{tag}

{/tag}

International Journal of Computer Applications

© 2014 by IJCA Journal

Volume 96 - Number 1

Year of Publication: 2014

Authors:

V. Sakthivel

Rathlavath Chandru

Elizabeth Elias

10.5120/16758-6312

{bibtex}pxc3896312.bib{/bibtex}

Abstract

In this paper the design of a totally multiplier-less M-Channel Modified Discrete Fourier Transform (MDFT) Filter bank with Perfect reconstruction has been proposed. Canonic Sign Digit (CSD) based Finite Impulse Response (FIR) prototype filter with low implementation complexity is designed. The performance of the MDFT filter bank designed with this filter is optimized using Artificial Bee Colony (ABC) algorithm. This design leads to very low implementation complexity and hence low power dissipation and low chip area, which are desirable in upcoming applications such as software defined radio, wireless communication and portable computing systems.

References

- M. G. Bellanger and J. L. Daguet (1974). TDM-FDM transmultiplexer: Digital polyphase and FFT, IEEE Trans. Commun, Vol. COM-22, pp. 1199-1204.
- Bindiya T. S. and Elias, E (2014, February). Design of multiplier-less sharp transition

width MDFT filter banks using modified metaheuristic algorithms. *International Journal of Computer Applications*, 88(2), 1-13.

- N. J. Fliege (1993). Computational efficiency of modified DFT –polyphase filter banks. In *Proc. 27th Asilomar Conf. Signals, Systems and Computers*, Asilomar Nov. 1993, 1296-1300.
- Fliege, N. J. (1994, April). Modified DFT polyphase SBC filter banks with almost perfect reconstruction. In *Acoustics, Speech, and Signal Processing, 1994. ICASSP-94.*, 1994 IEEE International Conference on, Vol. 2, pp. 149-152.
- Karp, T. and Fliege, N. J. (1999). Modified DFT filter banks with perfect reconstruction. *Circuits and Systems II: Analog and Digital Signal Processing*, IEEE Transactions on, 46(11), 1404-1414.
- Lim, Y. C. , Yang, R. , Li, D. , and Song, J. (1999). Signed power-of-two term allocation scheme for the design of digital filters. *Circuits and Systems II: Analog and Digital Signal Processing*, IEEE Transactions on, 46(5), 577-584.
- Hartely, R. I. (1996). Subexpression sharing in filters using canonic signed multipliers. *Circuits and Systems II: Analog and Digital Signal Processing*, IEEE Transactions on, 43(10), 677-688.
- Bindiya T. S. and Elias, E (2012). Design of Multiplier-less Reconfigurable Non-uniform channel filters using metaheuristic algorithms, *International Journal of Computer Applications*, Published by Foundation of Computer Science, New York, USA, 59(11): 1-11.
- D. Karaboga and B. Basturk (2008) . On the performance of artificial bee colony (ABC) algorithm. *Applied Soft Computing* 8 (2008), 687-697.
- Dervis Karaboga , Celet Ozturk, Nurhan Karaboga, Beyza Gorkemli (2012). Artificial bee colony programming for symbolic regression. *Erciyes University, Engineering Faculty, Intelligent Systems Research Group. Information Science* 209 (2012), 1-15.
- Dervis Karaboga (2005). An idea based on Honey bee Swarm for Numerical Optimization. Technical Report –TR06, Erciyes University, Engineering Faculty, Computer Engineering Department, 2005.
- B. Basturk and D. Karaboga (2006). An artificial bee colony(ABC) algorithm for numeric optimization, in : *IEEE Swarm Intelligence Symposium 2006*, May 12-14, Indianapolis, IN, USA, 2006.
- Fliege, N. J. (1994). *Multirate digital signal processing*. Chichester, U. K. :Wiley.
- R. E. Crochiere and L. R. Rabiner (1983) . *Multirate Digital Signal Processing*. Englewood Cliffs, NJ: Prentice-Hall.
- P. P. Vaidyanathan (1993) . *Multirate systems and filter banks*. Englewood Cliffs, NJ: Prentice-Hall.
- Manoj, V. J. and Elias, E. (2012). Artificial bee colony algorithm for the design of multiplier-less nonuniform filter bank transmultiplexer. *Information Sciences*, 192, 193-203.
- Manuel, M. , and Elias, E. (2013). Design of frequency response masking FIR filter in the canonic signed digit space using modified artificial bee colony algorithm. *Engineering Applications of Artificial Intelligence*, 26(1), 660-668.

Index Terms

Computer Science

Circuits And Systems

Keywords

Multiplier-less Modified DFT filter banks with Perfect Reconstruction Canonic
Signed Digit
Artificial Bee Colony Algorithm