



# Multiresolution analysis for linear canonical S transform

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Received: 27 June 2021 / Accepted: 14 September 2021 / Published online: 4 October 2021  
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## Abstract

To deal with the time-varying signals, linear canonical S transform (LCST) is introduced to possess some desirable characteristics that are absent in conventional time–frequency transforms. Inspired by LCST, we in this paper developed an idea of novel MRA associated with LCST. Moreover, the construction method of orthogonal wavelets is developed. Finally an example is provided to justify the results.

**Keywords** Linear canonical S transform · Scaling function · Multiresolution analysis · Orthogonality

**Mathematics Subject Classification** 42C40 · 42C15 · 43A70 · 11S85 · 47G10

## 1 Introduction

The Stockwell transform mostly known as S transform (ST) was studied by Stockwell et al. in [9]:

$$S[f](\xi, \zeta) = \int_{-\infty}^{\infty} f(t) \frac{|v|}{\sqrt{2\pi}} e^{-\frac{|t-\zeta|^2 \zeta^2}{2}} e^{-i2\pi \xi t} dt \quad (1)$$

The ST is unique in nature as it provides frequency-dependent resolution while maintaining a direct relationship with the Fourier spectrum. Due to this reason it has

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Communicated by Kenneth Berenhaut.

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