

Spectral representation of multi-dimensional discrete time self-similar processes

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Abstract

We consider a discrete scale invariant (DSI) process $\{X(t), t \in \mathbf{R}^+\}$ with scale $l > 1$. We consider to have some fix number of observations in every scale, say T , and to get our samples at discrete points α^k , $k \in \mathbf{W}$ where α is obtained by the equality $l = \alpha^T$ and $\mathbf{W} = \{0, 1, \dots\}$. So we provide a discrete time scale invariant (DT-SI) process $X(\cdot)$ with parameter space $\{\alpha^k, k \in \mathbf{W}\}$. We find the spectral representation of the covariance function of such DT-SI process. By providing harmonic like representation of multi-dimensional self-similar processes, spectral density function of them are presented. Finally we find the spectral density matrix of such DT-SI process and its associated T -dimensional self-similar process.

Keywords

Discrete scale invariance, Spectral representation, Multi-dimensional self-similar processes.

References

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