The reverse dimple in space-time covariance models

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Recently several efforts have been made to model spatial-temporal covariance functions. The majority of covariance model structures are monotonic decreasing, typically remains non-negative. One class of spatially isotropic models proposed by Gneiting(2002) has been used as a building block to model various complicated non-separable models. Kent and et al. (2011) draw out attention on the counterintuitive presence of possible “dimple” property associated with these covariance models. In this paper, we first attempt to propose a simple approach to model potentially negative value stationary spatial-temporal models. Second, we show that in certain circumstances such spatial-temporal models possess a reverse dimple. To illustrate analytical findings, results of numerical calculations and numerous plots are presented.

Key Words: Dimple Effect, Full symmetry, Hole Effect, Nonseparability, Regularly Varying, Turning Bands Operator.