

**Abstract:**

A non-Gaussian time series with a generalized Laplace marginal distribution is used to model road topography. The model encompasses variability exhibited by a Gaussian AR(1) process with randomly varying variance that follows a particular autoregressive model that features the gamma distribution as its marginal. A simple estimation method to fit the correlation coefficient of each of two autoregressive components is proposed. The one for the Gaussian AR(1) component is obtained by fitting the frequency of zero crossing, while the autocorrelation coefficient for the gamma autoregressive process is fitted from the autocorrelation of the squared values of the model. The shape parameter of the gamma distribution is fitted using the explicitly given moments of a generalized Laplace distribution. Another general method of model fitting based on the correlation function of the signal is also presented and compared with the zero-crossing method. It is demonstrated that the model has the ability to accurately represent hilliness features of road topography providing a significant improvement over a purely Gaussian model.