

# **Optimal confidence regions for the two-parameter exponential distribution based on records**

## **ABSTRACT**

In this article, we propose two families of optimal confidence regions for the location and scale parameters of the two-parameter exponential distribution based on upper records. Constrained optimization problems are used to find the smallest-area confidence regions for the exponential parameters with a specified confidence level. Optimal prediction interval for the future records is also proposed. Two numerical examples as well as a simulation study, are presented for illustrative purposes. It is shown that the reduction in area of the optimal joint confidence region with respect to the existing confidence regions is substantial.

**Keyword:** Constrained optimization; Lagrangian method; Joint confidence regions