# 11TH ISC2019 INTERNATIONAL STATISTICS CONGRESS

4-8 OCTOBER 2019

VOGUE HOTEL BODRUM

TÜRK İSTATİSTİK DERNEĞİ

GİRESUN ÜNİVERSİTESİ 2006

## ABSTRACTS & PROCEEDINGS BOOK

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# Approximation of Continuous Random Variables for Evaluating Reliability of Complex Stress-Strength Models

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**Abstract**
The term “stress–strength model” usually refers to a component (or system) with an intrinsic random strength that is subject to a random stress during its functioning, so that it works only when the strength is greater than the stress. The probability of this event occurring is denominated as the reliability parameter.

If the distributions of both strength and stress, usually modeled as independent continuous random variables, are known, the reliability parameter can be determined by using ordinary transformation techniques; however, this approach becomes cumbersome, if not impossible to apply, when stress and strength depend upon several stochastic factors through a known but complex functional relationship. In this case, the reliability parameter can be computed merely by Monte Carlo simulation, which can require a lot of computation time. Approximation-by-discretization techniques represent an alternative and pragmatic solution to this problem, which drastically cuts down computation time while retaining a satisfactory degree of accuracy.

In this work, we review and adapt several discretization techniques for continuous random variables that have been proposed so far in the literature and apply them to the computation of the reliability parameter of stress-strength models, describing their features and comparing their performances also with reference to practical problems.

**Key Words:** Approximation, discretization, Monte Carlo simulation, reliability parameter.