Some binary start-up demonstration tests and associated inferential methods

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Abstract During the past few decades, substantial research has been carried out on start-up demonstration tests. In this paper, we study the class of binary start-up demonstration tests under a general framework. Assuming that the outcomes of the start-up tests are described by a sequence of exchangeable random variables, we develop a general form for the exact waiting time distribution associated with the length of the test (i.e., number of start-ups required to decide on the acceptance or rejection of the equipment/unit under inspection). Approximations for the tail probabilities of this distribution are also proposed. Moreover, assuming that the probability of a successful start-up follows a beta distribution, we discuss several estimation methods for the parameters of the beta distribution, when several types of observed data have been collected from a series of start-up tests. Finally, the performance of these estimation methods and the accuracy of the suggested approximations for the tail probabilities are illustrated through numerical experimentation.