## Tests For Equality Of Intensities Of Failures Of A Repairable System Under Two Competing Risks

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## Abstract

Let a repairable system be subject to failure due to two competing risks. It is assumed that repairs are instantaneous.

Let  $N_1(t)$  and  $N_2(t)$  be the numbers of failures under risks of type I and II respectively which the system suffers upto time t. Let  $N(t) = N_1(t) + N_2(t)$ . We assume that  $N_1(t)$  and  $N_2(t)$  are nonhomogeneous Poisson processes (NHPP's) with cumulative intensity functions  $\Lambda_1(t)$  and  $\Lambda_2(t)$  respectively. Hence N(t) is also an NHPP with cumulative intensity function  $\Lambda(t) = \Lambda_1(t) + \Lambda_2(t)$ . The sampling scheme which is adopted is to observe the system until n failures take place i.e. until time  $t_n$  such that  $N(t_n) = n$ . Necessarily  $N_1(t_n) = n_1(say)$  and  $N_2(t_n) = n_2(say)$  are random variables. In this paper we develop tests for  $H_0 : \Lambda_1(s) = \Lambda_2(s)$  based on the realizations  $N_1(s)$  and  $N_2(s)$ ,  $0 \le s \le t_n$ .

We obtain the asymptotic null distributions of the proposed test statistics as  $n \to \infty$  (hence as  $t_n \to \infty$ ). We show that these tests are consistent for certain large classes of alternatives.

We compare the proposed tests in the sense of Pitman 'Asymptotic Relative Efficiency' as modified to this setup. We will also illustrate the procedure by applying it to a real data set.