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The local power of the gradient test

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Abstract The asymptotic expansion of the distribution of the gradient test statistic is derived for a composite hypothesis under a sequence of Pitman alternative hypotheses converging to the null hypothesis at rate $n^{-1/2}$, n being the sample size. Comparisons of the local powers of the gradient, likelihood ratio, Wald and score tests reveal no uniform superiority property. The power performance of all four criteria in one-parameter exponential family is examined.

Keywords Asymptotic expansions · Chi-square distribution · Gradient test · Likelihood ratio test · Pitman alternative · Power function · Score test · Wald test