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On local power properties of the LR, Wald, score and gradient tests in nonlinear mixed-effects models

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Abstract The local powers of some tests under the presence of a parameter vector, $\boldsymbol{\omega}$ say, that is orthogonal to the remaining parameters are studied in this paper. We show that some of the coefficients that define the local powers of the tests remain unchanged regardless of whether $\boldsymbol{\omega}$ is known or needs to be estimated, whereas the others can be written as the sum of two terms, the first of which being the corresponding term obtained as if $\boldsymbol{\omega}$ were known, and the second, an additional term yielded by the fact that $\boldsymbol{\omega}$ is unknown. We apply our general result in the class of nonlinear mixed-effects models and compare the local powers of the tests in this class of models.

Keywords Asymptotic expansions · Gradient test · Likelihood ratio test · Nonlinear mixed-effects models · Score test · Wald test