GENERALIZED F-TESTS FOR UNBALANCED NESTED DESIGNS UNDER HETEROSCEDASTICITY

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Abstract. Two-factor fixed-effect unbalanced nested design model without the assumption of equal error variance is considered. Using the generalized definition of p-values, exact tests under heteroscedasticity are derived for testing "main effects" of both factors. These generalized F-tests can be utilized in significance testing or in fixed level testing under the Neyman-Pearson theory. Two examples are given to illustrate the proposed test and to demonstrate its advantages over the classical F-test. Extensions of the procedure for three-factor nested designs are briefly discussed.

Key words and phrases: Nested design, unbalanced models, heteroscedasticity, generalized p-values.