

Optimal Designs for a nonlinear calibration models in radiology

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The tools provided by optimal design of experiments theory are applied to a nonlinear calibration model. This is motivated by the need of estimating radiation doses using radiochromic films. The calibration model is in this case nonlinear and the explanatory variable cannot be worked out explicitly from the model. The main problem is that a design has to be found on the dependent variable. For that the inverse function theorem will be used to obtain an information matrix to be optimized. We compare in a particular case the proper D-optimal design on the response variable and the transformed design in the explanatory variable using the model function for given nominal values of the parameters. Suboptimal designs with more support points and c-optimal designs are also provided for estimating the parameters of interest.

Keywords: Information Matrix, Inverse Function Theorem, Equivalence theorem.

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