

# An Ill-Posed Inverse Problem in Experimental Design

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**Abstract:** Experimental design is an effective and commonly used tool in scientific, industrial and engineering investigations. A full factorial experiment allows all factorial effects to be estimated independently. However, when studying many factors simultaneously, it is often too costly to perform a full factorial experiment; therefore, only a fraction is used in practice. This leads to an ill-posed inverse problem: it is impossible to estimate all factorial effects from the data. Principles such as hierarchical ordering, effect sparsity and effect heredity have been used to guide and justify design and analysis. This talk reviews some recent advances in data analysis and design theory dealing with this ill-posed problem. Theory and construction of optimal nonregular and supersaturated designs are discussed.