

INTEGRATED DATA ANALYSIS OF COMPLEMENTARY EXPERIMENTS

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Abstract

The Integrated Data Analysis (IDA) concept allows to combine data from different experiments to obtain improved results [1,2]. Heterogeneous and complementary experimental data as well as various kinds of physical prior information are easily integrated employing Bayesian probability theory.

The concepts of IDA are compared to classical approaches. In contrast to classical inversion techniques IDA needs only forward modeling. The ingredients are given by a model linking the physical quantities of interest to the measured data, a statistical description of the measurements, and a probabilistic description of all nuisance model parameters suffering from uncertainties. In practice the probabilistic description of systematic measurement and model uncertainties are of major importance to resolve data inconsistencies. Complex error propagation is obtained automatically combining meta-data in a concise probabilistic one-step analysis.

The conceptual simplicity and applicability of IDA will be shown with combinations of heterogeneous experiments at the plasma fusion experiments ASDEX Upgrade and Wendelstein 7-AS.

References:

[1] R. Fischer, A. Dinklage, and E. Pasch, Plasma Phys. Control. Fusion **45** (2003) 1095

[2] www.ipp-mpg.info/bda

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