

# Estimation in Heterogeneous Growth Models

**Andrew L. Rukhin**

*Statistical Engineering Division  
National Institute of Standards and Technology  
Gaithersburg, MD 20899-0001 USA,  
E-mail: rukhin@nist.gov*

**Key words:** DerSimonian-Laird procedure, Estimating equation, Maximum likelihood, Meta-analysis, Random effects, Variance components

A question of fundamental importance for meta-analysis of heterogeneous data studies is how to form a best consensus estimator of common parameters, and what uncertainty to attach to the estimate. This issue is addressed for a class of unbalanced linear designs which include classical growth curve models. The obtained solution is similar to the DerSimonian and Laird (1986) popular method for the simple meta-analysis model. By using almost unbiased variance estimators, an estimator of the covariance matrix of this procedure is derived.