

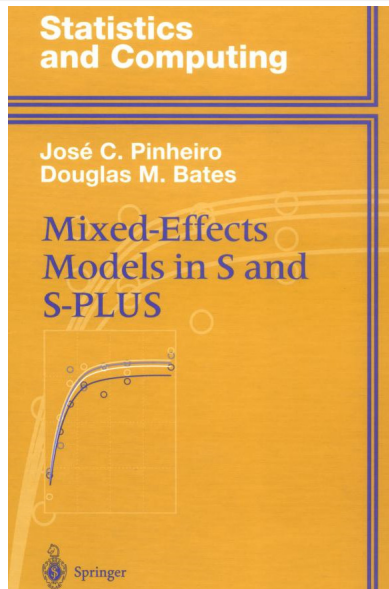
# Mixed effects models

## ADMB and stock assessment

Arni Magnusson  
Anders Nielsen

ICES, 21–25 Feb 2011

## Pinheiro and Bates 2000



# Linear mixed effects

Analysis of covariance (pp. 30–41)

$$\text{LM} \quad y_{ij} = \beta_{0i} + \beta_1 x_{ij} + \varepsilon_{ij} \quad \varepsilon_{ij} \sim N(0, \sigma^2)$$

$$\text{LME} \quad y_{ij} = \beta_0 + b_i + \beta_1 x_{ij} + \varepsilon_{ij} \quad b_i \sim N(0, \sigma_b^2)$$
$$\varepsilon_{ij} \sim N(0, \sigma^2)$$

# Nonlinear mixed effects

Logistic growth model (pp. 338-350 and 354-362)

$$y_{ij} = \frac{\phi_1}{1 + \exp[-(t_{ij} - \phi_2)/\phi_3]} + \varepsilon_{ij}$$

# Generalized linear mixed effects

Poisson and negative binomial families

<http://glmmadmb.r-forge.r-project.org>