

Portnoy, Stephen

Asymptotic behavior of M-estimators of p regression parameters when p^2/n is large. I. Consistency. (English) [Zbl 0584.62050](#)

Ann. Stat. 12, 1298-1309 (1984).

M-estimation of the regression parameters in the general linear model $Y_i = \sum_{j=1}^p \beta_j x_{ji} + R_i$ is defined as the solution to the system of equations

$$\sum_{i=1}^n x_{ji} \psi(Y_i - \sum_{j=1}^p \beta_j x_{ji}), \quad j = 1, \dots, p.$$

This paper considers asymptotic properties of M-estimators, $\hat{\beta}$.

In the case of linear regression it is shown that if ψ is increasing, $p(\log p)/n \rightarrow 0$, and some other relatively mild conditions hold, then $\|\hat{\beta}\|^2 = O_p(p/n)$. In the analysis of variance case of the general linear model it is shown that if $p(\log p)/n \rightarrow 0$ then at least $\max_j |\hat{\beta}_j| = O_p((p(\log p)/n)^{1/2})$. Also a result giving asymptotic normality for arbitrary linear combinations $a'\hat{\beta}$ is presented.

Reviewer: [H.Nyquist](#)

MSC:

- [62F35](#) Robustness and adaptive procedures (parametric inference)
- [62J05](#) Linear regression; mixed models
- [62J10](#) Analysis of variance and covariance (ANOVA)
- [62E20](#) Asymptotic distribution theory in statistics

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Keywords:

[consistency](#); [robustness](#); [M-estimation](#); [general linear model](#); [asymptotic normality](#); [linear combinations](#)

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