

# A Comparative Study of Boundary Effects for Kernel Smoothing

Jan Koláček<sup>1</sup>, Jitka Poměnková  
Masaryk University, Brno

**Abstract:** The problem of boundary effects for nonparametric kernel regression is considered. We will follow the problem of bandwidth selection for Gasser–Müller estimator especially. There are two ways to avoid the difficulties caused by boundary effects in this work. The first one is to assume the circular design. This idea is effective for smooth periodic regression functions mainly. The second presented method is reflection method for kernel of the second order. The reflection method has an influence on the estimate outside edge points. The method of penalizing functions is used as a bandwidth selector. This work compares both techniques in a simulation study.

**Keywords:** bandwidth selection, boundary effects, kernel estimation, non-parametric regression

---

<sup>1</sup>Supported by the GACR: 402/04/1308