Convergence results and sharp estimates for the voter model interfaces

S. Belhaouari†
T. Mountford‡
Rongfeng Sun§
G. Valle¶

Dec 5, 2005

Abstract: We study the evolution of the interface for the one-dimensional voter model. We show that if the random walk kernel associated with the voter model has finite $\gamma$th moment for some $\gamma > 3$, then the evolution of the interface boundaries converge weakly to a Brownian motion under diffusive scaling. This extends recent work of Newman, Ravishankar and Sun. Our result is optimal in the sense that finite $\gamma$th moment is necessary for this convergence for all $\gamma \in (0, 3)$. We also obtain relatively sharp estimates for the tail distribution of the size of the equilibrium interface, extending earlier results of Cox and Durrett, and Belhaouari, Mountford and Valle.

Keywords: voter model interface, coalescing random walks, invariance principle, Brownian web, continuum limit.

†École Polytechnique Fédérale de Lausanne (EPFL), 1015, Lausanne, Switzerland
‡École Polytechnique Fédérale de Lausanne (EPFL), 1015, Lausanne, Switzerland
§EURANDOM, P. O. Box 513, 5600 MB Eindhoven, The Netherlands
¶École Polytechnique Fédérale de Lausanne (EPFL), 1015, Lausanne, Switzerland

i