

A Universality Property for Last-Passage Percolation Paths Close to the Axis

Thierry Bodineau, *Université Pierre et Marie Curie, France*
James Martin, *Université Paris 7, France*

Abstract

We consider a last-passage directed percolation model in \mathbb{Z}_+^2 , with i.i.d. weights whose common distribution has a finite $(2+p)$ th moment. We study the fluctuations of the passage time from the origin to the point (n, n^a) . We show that, for suitable a (depending on p), this quantity, appropriately scaled, converges in distribution as $n \rightarrow \infty$ to the Tracy-Widom distribution, irrespective of the underlying weight distribution. The argument uses a coupling to a Brownian directed percolation problem and the strong approximation of Komlós, Major and Tusnády.

Full text: [PDF](#) | [PostScript](#)

Pages: 105-112

Published on: June 9, 2005

Bibliography

Baccelli, F.; Borovkov, A.; Mairesse, J. Asymptotic results on infinite tandem queueing networks. *Probab. Theory Related Fields* 118 (2000), no. 3, 365--405. [MR1800538](#) (2002i:60165)

Baik, J.; Ben Arous, G.; Péché, S. Phase transition of the largest eigenvalue for non-null sample covariance matrices. Preprint [math.PR/0403022](#)

Baik, Jinho; Deift, Percy; McLaughlin, Ken T.-R.; Miller, Peter; Zhou, Xin. Optimal tail estimates for directed last passage site percolation with geometric random variables. *Adv. Theor. Math. Phys.* 5 (2001), no. 6, 1207--1250. [MR1926668](#) (2003h:60141)

Baik, J.; Suidan, T. A GUE central limit theorem and universality of directed first and last passage site percolation. *Int. Math. Res. Not.* 2005:6 325-337. Math. Review number not available.

Baryshnikov, Yu. GUEs and queues. *Probab. Theory Related Fields* 119 (2001), no. 2, 256--274. [MR1818248](#) (2002a:60165)

Doumerc, Yan. A note on representations of eigenvalues of classical Gaussian matrices. *Séminaire de Probabilités XXXVII*, 370--384, Lecture Notes in Math., 1832, Springer, Berlin, 2003. [MR2053054](#) (2005c:60025)

Glynn, Peter W.; Whitt, Ward. Departures from many queues in series. *Ann. Appl. Probab.* 1 (1991), no. 4, 546--572. [MR1129774](#) (92i:60162)

Gravner, Janko; Tracy, Craig A.; Widom, Harold. Limit theorems for height fluctuations in a class of discrete space and time growth models. *J. Statist. Phys.* 102 (2001), no. 5-6, 1085--1132. [MR1830441](#) (2002d:82065)

Johansson, Kurt. Shape fluctuations and random matrices. *Comm. Math. Phys.* 209

Research Support Tool

[Capture Cite](#)
[View Metadata](#)
[Printer Friendly](#)

▼ [Context](#)

[Author Address](#)

▼ [Action](#)

[Email Author](#)
[Email Others](#)

(2000), no. 2, 437--476. [MR1737991](#) (2001h:60177)

Johansson, Kurt. Transversal fluctuations for increasing subsequences on the plane. *Probab. Theory Related Fields* 116 (2000), no. 4, 445--456. [MR1757595](#) (2001e:60210)

Komlós, J.; Major, P.; Tusnády, G. An approximation of partial sums of independent RV's, and the sample DF. II. *Z. Wahrscheinlichkeitstheorie und Verw. Gebiete* 34 (1976), no. 1, 33--58. [MRO402883](#) (53 #6697)

Krug, J.; Spohn, H. Kinetic roughening of growing surfaces (1992). In C. Godrèche, ed., *{Solids far from equilibrium}* Collection Aléa-Saclay: Monographs and Texts in Statistical Physics, 1, pages 479-582. Cambridge University Press, Cambridge. Math. Review number not available.

Major, Péter. The approximation of partial sums of independent RV's. *Z. Wahrscheinlichkeitstheorie und Verw. Gebiete* 35 (1976), no. 3, 213--220. [MRO415743](#) (54 #3823)

Martin, James B. Large tandem queueing networks with blocking. *Queueing Syst.* 41 (2002), no. 1-2, 45--72. [MR1911126](#) (2003e:60209)

Martin, James B. Limiting shape for directed percolation models. *Ann. Probab.* 32 (2004), no. 4, 2908--2937. [MR2094434](#)

O'Connell, Neil. Random matrices, non-colliding processes and queues. *Séminaire de Probabilités, XXXVI*, 165--182, Lecture Notes in Math., 1801, Springer, Berlin, 2003. [MR1971584](#) (2004g:15038)

O'Connell, Neil; Yor, Marc. A representation for non-colliding random walks. *Electron. Comm. Probab.* 7 (2002), 1--12 (electronic). [MR1887169](#) (2003e:60189)

Tracy, Craig A.; Widom, Harold. Distribution functions for largest eigenvalues and their applications. *Proceedings of the International Congress of Mathematicians, Vol. I (Beijing, 2002)*, 587--596, Higher Ed. Press, Beijing, 2002. [MR1989209](#) (2004f:82034)

[Home](#) | [Contents](#) | [Submissions, editors, etc.](#) | [Login](#) | [Search](#) | [EJP](#)

[Electronic Communications in Probability](#). ISSN: 1083-589X