A CONTINUOUS LIMIT FOR LARGE RANDOM PLANAR MAPS.

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We investigate scaling limits of large random graphs drawn on the two-dimensional sphere and viewed as metric spaces. This study is motivated in part by the use of random graphs as models of discrete random geometry in two-dimensional quantum gravity. Consider a triangulation of the sphere chosen uniformly at random among all triangulations with a fixed number of faces (two triangulations are identified if they correspond via a deformation of the sphere). We equip the vertex set of this triangulation with the usual graph distance. When the number of faces tends to infinity, the (suitably rescaled) resulting metric space converges in distribution, in the sense of the Gromov-Hausdorff distance, towards a random compact metric space called the Brownian map. This result, which confirms a conjecture of Schramm in 2006, holds with the same limit for much more general random graphs drawn on the sphere. The Brownian map thus appears as a universal model of a random surface, which is homeomorphic to the sphere but has Hausdorff dimension 4.

Keywords: random graph, random planar map, Brownian map, Gromov-Hausdorff convergence, scaling limit

[1] Le Gall, J.F., The topological structure of scaling limits of large planar maps. *Invent. Math.*, 169, 621-670 (2007)

[2] Le Gall, J.F., Geodesics in large planar maps and in the Brownian map. *Acta Math.*, 205, 287-360 (2010)

[3] Le Gall, J.F., Uniqueness and universality of the Brownian map. Preprint, arXiv:1105.4842