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Second-Year Review of Paul Mortimer

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Paul Mortimer's work on lattice path enumeration during the first two years of his PhD has been to my full satisfaction.

As his first project, Paul worked on the counting of patterns in Dyck paths, leading to Narayana and related numbers. In this context, we have discovered a new and direct bijective proof for the well-known result that Dyck paths with a fixed number of steps at odd height and Dyck paths with a fixed number of peaks are equinumerate, and we have extended this bijection to bilateral Dyck paths.

In my last report I wrote that I expected the bijection to lead to a small paper in the next couple of months, and indeed a paper has been submitted last March.

He has now also successfully applied techniques for deriving the generating function of weighted directed lattice paths using generating functions utilising the so-called Kernel method.

A second paper on random walks in triangular domains is nearly completed. It contains a clever utilisation of the algebraic Kernel method and heavily relies on exploitation of the symmetries of the problem at hand. An equinumeracy result relating random walks to two-coloured Motzkin paths is an unexpected gem.

His workshop attendance in January and his subsequent research stay in Australia have also been successful.

He has now sufficiently "grown up" to apply the methods acquired to a third problem, related to walks in wedges, albeit with weighting visits to the boundary, which makes the problem considerably harder.

I am confident that Paul is capable of finishing his PhD within the regular time and having published three papers, hopefully before the EPSRC guidelines for open access are starting to bite.

Thomas Prellberg