

Colloquium

SOME BIJECTIVE PROOFS

ABOUT TREE-CHILD NETWORKS

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地 點：應用數學系多媒體教室(理 408 室)

摘 要：

McDiarmid, Semple, and Welsh (2015) showed that the number of tree-child networks with n leaves has the factor n^{2n} in its main asymptotic growth term. In our previous paper (2021), we improve this by completely identifying the main asymptotic growth term up to a constant. More precisely, we show that the number of tree-child networks with n leaves grows like

$$\Theta\left(n^{-2/3}e^{a_1(3n)^{1/3}}\left(\frac{12}{e^2}\right)^n n^{2n}\right),$$

where $a_1 = -2.338107410\dots$ is the largest root of the Airy function of first kind. For the proof, we bijectively map the underlying graph-theoretical problem onto a problem on words (I present this proof on the first part of this talk). For the latter, we can find a recurrence to which a recent powerful asymptotic method of Elvey Price, Fang, and Wallner (2019) can be applied.

In a recent paper, Pons and Batle (2021) conjectured a relation between tree-child networks with n leaves and k reticulations and certain words. In our previous short note (2022), we prove their conjecture for the (important) class of one-component tree-child networks. On the second part of my talk, I will tell the history of solving this conjecture, and we further transform the problem into a bijection problem which structure similar to Young tableau and propose a new conjecture.

