

Topological Recursion: a recursive way of counting surfaces

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Enumerating various kinds of surfaces is an important goal in combinatorics of maps, enumerative geometry, string theory, statistical physics, and other areas of mathematics or theoretical physics. For example the famous Mirzakhani's recursion is about enumerating hyperbolic surfaces. It is often easier to enumerate planar surfaces, with the lowest topologies (disc, cylinder), and the question is how to enumerate surfaces of higher genus and with more boundaries. Many of the surface enumeration problems, satisfy a universal recursion, known as the "topological recursion", which, from the enumeration of discs and cylinders, gives all the other topologies. Moreover this recursion has many beautiful mathematical properties by itself, and allows to make the link with other areas of mathematics and physics, in particular integrable systems, random matrices, and many others.

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