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Hurwitz numbers and matrix models

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Hurwitz numbers enumerate combinatorial classes of mapping of genus g Riemann surfaces on the complex projective line with branchings at a fixed number of points (at three points for the case of Belyi pairs and Grothendieck's dessins d'enfant and at n points for hypergeometric Hurwitz numbers). The first variant of a matrix-model description of such mappings was proposed by Itzykson and Di Francesco in 1993. We construct the matrix model describing the general situation of n branching points with ramification data fixed at two of them. All these models are tau functions of the KP hierarchy and upon some constraints on their generating functions their solutions can be attained using the topological recursion technique for special chains of Hermitian matrices. The corresponding systems are conjecturally related to TQFTs.

(Based on joint papers with Jan Ambjørn, NBI, Copenhagen)

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