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About Goulden–Jackson's Matching-Jack and b-conjectures

The Matching-Jack conjecture and the b-conjecture were introduced by Goulden and Jackson in 1996. They suggest that certain series of Jack polynomials in three alphabets are generating functions of maps on general surfaces (orientable or not), counted with a nonorientability weight depending on the Jack parameter b. At $b = 0$ and $b = 1$ they reduce to classical representation theory results on orientable maps (Schur functions) and on general maps (zonal polynomials). For general b, both conjectures are still open.

I will present some partial results, and then discuss connections to other problems, including Lassalle's conjecture on Jack characters, b-Hurwitz numbers, and the Macdonald shuffle theorems.