Partial-dual polynomials and signed intersection graphs

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Abstract:

Recently, Gross, Mansour and Tucker introduced the partial-dual polynomial of a ribbon graph as a generating function that enumerates all partial duals of the ribbon graph by Euler genus. To investigate the partial-dual polynomial one only needs to focus on bouquets, i.e., ribbon graphs with exactly one vertex. In this talk, we shall further show that the partial-dual polynomial of a bouquet essentially depends on the signed intersection graph of the bouquet rather than on the bouquet itself. We then give a characterization of when a bouquet has a planar partial dual in terms of its signed intersection graph. Finally we consider a conjecture posed by Gross, Mansour and Tucker that there is no orientable ribbon graph whose partial-dual polynomial has only one non-constant term, this conjecture is false and we give a characterization of when all partial duals of a bouquet have the same Euler genus. This is joint work with Qi Yan (Qi Yan, Xian'an Jin, Partial-dual polynomials and signed intersection graphs, Forum Math. Sigma 10 (2022) e69.).