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E-polynomials of character varieties associated to a real curve

Given a Riemann surface Σ denote by $M_n(\mathbb{F}) := Hom_\xi(\pi_1(\Sigma), GL_n(\mathbb{F}))/GL_n(\mathbb{F})$ the ξ-twisted character variety for $\xi \in \mathbb{F}$ a n-th root of unity. An anti-holomorphic involution τ on Σ induces an involution on $M_n(\mathbb{F})$ such that the fixed point variety $M_n^\tau(\mathbb{F})$ can be identified with the character variety of "real representations" for the orbifold fundamental group $\pi_1(\Sigma, \tau)$. When $\mathbb{F} = \mathbb{C}$, $M_n^\tau(\mathbb{C})$ is an ABA-brane: a half-dimensional complex subvariety of $M_n(\mathbb{C})$ which is sent to a Lagrangian submanifold of the moduli space of Higgs bundles under the non-abelian Hodge correspondence.

The E-polynomial of $M_n(\mathbb{C})$ was determined by Hausel and Rodriguez-Villegas by counting points in $M_n(\mathbb{F}_q)$ for finite fields $\mathbb{F}_q$. I will show how the same methods are used to calculate a generating function for the E-polynomial of $M_n^\tau(\mathbb{C})$ using the representation theory of $GL_n(\mathbb{F}_q)$.