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On the character varieties of manifolds obtained from the Whitehead link exterior by Dehn filling

A well-known method due to Riley characterizes the p-reps of the fundamental group of the exterior of a 2-bridge knot by the roots of a one-variable polynomial. (A p-rep of such a group is a representation with values in $\mathrm{SL}(2, C)$ which is parabolic on the peripheral subgroup.) We describe how to generalize this method to find the p-reps for all Dehn fillings on one boundary component of the Whitehead link exterior in terms of the filling slope. This is done by taking a "detour" through the eigenvalue variety of the unfilled manifold and using elimination theory to find a polynomial whose roots characterize the p-reps of the filled manifold. As an application, we determine the minimal Culler–Shalen norm for all such fillings and use this to make some statements about the structure of their character varieties.