On twisted Alexander invariants and applications to the Milnor fiber of a hyperplane arrangement.

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Cogolludo-Agustin and Florens studied twisted Alexander modules (over some PID) for plane curve complements, and they found a complete description on how the global Alexander polynomial and the local ones at singular points are related. But the problem of when these local twisted modules are torsion remained unsolved. A calculation of Suciu shows that both global and local twisted modules for line arrangements are torsion. I proved that, generically, these modules are also torsion for plane curve complements.

This local to global analysis on Alexander invariants can be generalized to the case of higher dimensional hypersurfaces, which carry non-isolated singularities. In this setup, I extended the divisibility results of Libgober and Maxim in the twisted context. As an application of the methods being used and developed, I improved Massey's upper bounds on the Betti numbers of the Milnor fiber of a central plane arrangement in complex three space. The upper bound I obtained is sharp in many cases. Calculations and comparisons to Cohen and Suciu's examples will be provided.