The equivalence theory for infinite type hypersurfaces

Abstract:

Holomorphic classification of real submanifolds in complex space is one of the central goals in complex analysis in several variables. This classification is well understood and approaches are well developed for submanifolds satisfying certain bracket generating conditions of Hormander type, while very little is known in more degenerate setting. In particular, somewhat surprisingly, the classification problem is still completely open for hypersurfaces in complex 2-space. The class of hypersurfaces bringing conceptual difficulties here is the class of (Levi-nonflat) infinite type hypersurfaces. In our joint work with Ebenfelt and Lamel, we develop the equivalence theory for infinite type hypersurfaces in $C^2$. We do so by providing a normal form for such hypersurfaces. We extensively use the newly developed approach of Associated Differential Equations. The normal form construction is performed in two steps: (i) we provide a normal form for associated ODES; (ii) we use the normal form of ODEs for solving the equivalence problem for hypersurfaces. Somewhat similarly to the Poincare-Dulac theory in Dynamical System, our classification theory exhibits resonances, convergence and divergence phenomena, Stokes phenomenon and sectorial regularity phenomena.

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