Geometric and Algebraic Jordan Block Structure in Vanishing Cohomology and in the Jacobian Algebra of an Isolated Singularity

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Abstract:
For a germ of a holomorphic function function with an isolated singularity, multiplication by f in the Jacobian algebra and the application of N, the logarithm of the unipotent map of the monodromy, to vanishing cohomology are related. This relation comes from associating to a function g the principare rate of growth of the integral of gdz on the vanishing cycles to the singularity as t goes to 0. In the integral of fgdz, the f comes out of the integral as a t, and using a relation in the Jacobian Algebra we end up applying N. This statement means that the Jordan blocks of f in the Jacobian Algebra are built up with the gluing of N Jordan blocks in vanishing cohomology. These gluings produce a non degenerate bilinear form in part of the primitive cohomology, when we bring in Grothendieck's and Poincare's bilinear forms into the setting. This bilinear form is readily computable from f and has a geometric meaning.