Characteristic Classes for Singularities of Linear Differential Equations

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The differential equations in question are homogeneous linear differential equations (of any order) and systems of homogeneous linear differential equations of order one. In both cases the coefficients belong to the field K=k((x)) of formal Laurent series in x with finite pole order. These equations are studied from the point of view of linear differential operators in finite dimensional vector spaces over K. The results resemble those of the theory of linear transformations in finite dimensional vector spaces, though the proofs are quite different, because for differential operators their is no (direct) way to define a characteristic polynomial. In his Ph.D. thesis (Nijmegen, 1993) R. Sommeling constructed a new object, the characteristic class of a differential operator, which has the properties which one might expect. A somewhat simplified treatment will be presented as well as remarks on computations.