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Power series in computer algebra. (English)

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Let f be a function, meromorphic in a neighbourhood of $z_0 \in \mathbb{C}$ and having a pole in z_0 [or being holomorphic in z_0]. The paper deals with the following method to compute the Laurent expansion [or the Taylor expansion] of f at z_0 : Find a homogeneous differential equation which has polynomials as coefficients and is satisfied by f , translate the differential equation into a linear recursion formula for the coefficients of the Laurent expansion [or the Taylor expansion] and calculate the coefficients from the recursion formula. This method may be applied to a wide class of functions; it has been implemented in the computer algebra systems Maple and Mathematica.

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Keywords : meromorphic; pole; Laurent expansion; Taylor expansion; homogeneous differential equation; linear recursion formula; computer algebra systems

Classification:

- **30D30** General theory of meromorphic functions
- **30B10** Power series (one complex variable)
- **68Q40** Symbolic computation, algebraic computation
- **30D05** Functional equations in the complex domain