

Ore localization with applications in D -module theory

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The global and local Bernstein-Sato polynomial of a given multivariate polynomial $f \in K[x_1, \dots, x_n]$ where K is of characteristic zero, plays an important role in D -module theory and in singularity theory, to name a few. We are interested in computing the local Bernstein-Sato polynomial of a given polynomial at a given point $p \in K^n$. Although several algorithms for its computation are already known, we will present a new algorithm that uses Ore localizations. Theoretically, our algorithm needs to employ product localizations. However, we prove that it suffices to work in another localization which is algorithmically easier to handle. Finally, we provide an algorithmic approach to compute the local Bernstein-Sato polynomial at a point, given via algebraic but non-rational coordinates. Applying this algorithm, it is possible to compute local Bernstein-Sato polynomials using symmetry arguments.