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**Anton Leykin\***, leykin@math.uic.edu, and **Josep Àlvarez Montaner**. *Computing characteristic cycles of local cohomology modules.*

Characteristic cycles can be used to examine the support of holonomic  $D$ -modules, in particular, detect the vanishing.

For a polynomial ring  $R = k[x_1, \dots, x_n]$ , we present a method to compute the characteristic cycle of the localization  $R_f$  for any nonzero polynomial  $f \in R$  that avoids a direct computation of  $R_f$  as a  $D$ -module by using Gröbner bases technique in noncommutative setting.

Based on this approach, we develop an algorithm for computing the characteristic cycle of the local cohomology modules  $H_I^r(R)$  for any ideal  $I \subseteq R$  using the Čech complex. The application of the algorithms are illustrated by examples of computations using our implementation in Macaulay 2. These include characteristic cycles of local cohomology modules and Lyubeznik numbers. (Received March 03, 2006)