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Anna, Ying Pun* (annapunyng@gmail.com). *On decomposition of the product of a monomial and a Demazure atom into atoms.* Preliminary report.

Haglund, Haiman and Loehr obtained a combinatorial formula for non-symmetric Macdonald polynomials $E_\gamma(x_1, \dots, x_n; q, t)$, which shares many properties with symmetric Macdonald polynomials, using skyline fillings of shape γ , satisfying certain constraints. In particular, one can obtain Demazure atoms (first studied by Lascoux and Schützenberger) by $\mathcal{A}_\gamma = E_{\bar{\gamma}}(x_n, \dots, x_1; \infty, \infty)$ and Demazure characters (key polynomials) by $\kappa_\gamma = E_\gamma(x_1, \dots, x_n; 0, 0)$, both of which form a basis for the polynomial ring. Haglund, Luoto, Mason, Remmel and van Willigenburg obtained new sets of tableaux-combinatorial objects called semistandard augmented fillings (SSAFs) by further studying the combinatorial formulas for Demazure atoms and characters given by the skyline fillings. They generalized the results on SSYT's like the Pieri Rule, the RSK algorithm and the Littlewood-Richardson(LR) rule. We prove that the product of a monomial and a Demazure atom is a positive sum of Demazure atoms by using the insertion on SSAFs developed by Mason and a refinement of the LR rule. This result proves one particular case in a conjecture which provides an approach to a combinatorial proof of Schubert positivity property. (Received November 14, 2015)