The digit-by-digit construction of polynomial lattice rules

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Polynomial lattice point sets are special variants of digital (t, m, d)-nets and play an important role in multivariate numerical integration, where they are used as node sets in so-called polynomial lattice rules. The (fast) component-by-component construction of polynomial lattice point sets is a particularly powerful method to obtain quadrature rules for approximating integrals over the d-dimensional unit cube.

In this talk, we present a new method to construct generating vectors of polynomial lattice rules by a digit-by-digit approach, which goes back to ideas of Korobov. In the talk, we will outline how the new algorithm works and show error bounds for the integration rules obtained. Furthermore, we present numerical results which will show that the new algorithm is competitive with the fast component-by-component construction of Cools and Nuyens.

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