Ideal Arithmetic and Infrastructure
in Purely Cubic Function Fields

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Abstract  this paper investigates the arithmetic of fractional ideals and the
infrastructure of the principal ideal class of a purely cubic function field of
unit rank one. We first describe how irreducible polynomials split into prime
ideals in purely cubic functions fields of nonzero unit rank. This decom-
position behavior is used to compute so-called canonical bases of fractional
ideals; such bases are very suitable for computation. We state algorithms for
ideal multiplication and, in the case of unit rank one, ideal reduction. The
paper concludes with an analysis of the infrastructure in the set of reduced
fractional principal ideals of a purely cubic function field of unit rank one.