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ON A NEW TYPE OF L-FUNCTION FOR ALGEBRAIC CURVES OVER FINITE FIELDS

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Recently there has emerged a new theory of curves over a finite field. This theory is exciting in that it establishes previously unknown analogies between cyclotomic fields and function fields over a finite field. An extremely important aspect of this work is a new type of L-series for these function fields. These L-series bear quite remarkable and exciting similarities to classical L-series of number fields. The purpose of this paper is to describe these new L-series in detail.

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Our desire to study such functions arose out of the following fact (discovered by L. Carlitz and independently, but much later, by the author): Let $i \in \mathbf{N}^+$. Then there exists a non-zero constant λ such that the convergent $1/T$-adic sum

$$\lambda^{-i} \sum_{0 \neq \beta \in \mathbf{F}_r[T]} \beta^{-i}, \qquad i \equiv 0(r-1),$$