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Scalar Multiplication on Koblitz Curves using τ^2 -NAF

Sujoy Sinha Roy and Chester Rebeiro and Debdeep Mukhopadhyay and Junko Takahashi and Toshinori Fukunaga

Abstract: The paper proposes a τ^2 -NAF method for scalar multiplication on Koblitz curves, which requires asymptotically $0.215m$ point additions in $GF(2^m)$. For τ^2 -NAF method, point quading operation $(a \rightarrow a^4)$ is performed instead of point squarings. The proposed method is faster than normal τ -NAF method, which requires around $\frac{m}{3}$ point additions. However, like width w based τ -NAF methods, there is an overhead of pre-computations in the τ^2 -NAF method. For extended binary fields of small size, the τ^2 -NAF based scalar multiplication requires almost same number of point additions as in width 4 τ -NAF method. Though, complexity wise, τ^2 -NAF based scalar multiplication and width 4 - τ -NAF based scalar multiplication are similar, but the techniques are different.

Category / Keywords: implementation / Koblitz curve, elliptic curve, scalar multiplication, τ^2 NAF

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Contact author: sujoyetc at cse iitkgp ernet in, chester@cse iitkgp ernet in, debdeep@cse iitkgp ernet in, takahashi junko@lab ntt co jp, toshi fukunaga@hco ntt co jp

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