



Applying pairings in isogeny crypto

verify full torsion P

In some CSIDH variants, we are given $P \in E(\mathbb{F}_p)$ and $Q \in E'(\mathbb{F}_p)$.

Q: verify that both P and Q have order $p + 1$, e.g. full torsion points

A: compute $\zeta = e(P, Q)$ and check that order ζ is $p + 1$.

speedup: -75%



fast pairings

Optimized pairing computation for the specific scenario $P \in E(\mathbb{F}_p), Q \in E'(\mathbb{F}_p)$

&



core idea

For $P \in E(\mathbb{F}_p)$ and $Q \in E'(\mathbb{F}_p)$, don't use curve arithmetic but pairing $e(P, Q)$ to get overlap in orders!

Faster isogeny subroutines



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compute full torsion P

In some CSIDH variants, we get E

Q: find $P \in E(\mathbb{F}_p)$ and $Q \in E'(\mathbb{F}_p)$ of order $p + 1$, e.g. full torsion points