

Hermite's Problem for Cubic Irrationals

Projective Approach (HAPD)

- Non-subtractive algorithm
- Projective space transformations
- Clean geometric interpretation

Subtractive Approach (Modified \sin^2)

- Enhanced subtractive algorithm
- Phase-preserving floor function
- Complex plane representation

Complete Solution to Hermite's Problem

Both approaches detect periodicity for all cubic irrationals

HAPD Algorithm Strengths

- Shorter periods
- More efficient computation
- Pure projective interpretation
- Direct matrix formulation

Modified \sin^2 Strengths

- Natural complex plane treatment
 - Explicit phase preservation
- Extension of Karpenkov's approach
- Compatible with existing theory

The complementary approaches to Hermite's problem provide full coverage for all cubic irrationals, including those with complex conjugate roots, offering both theoretical and computational advantages.