Qeios

Peer Review

Review of: "Arithmetic on Continued Fractions"

Hany Akeel Al-hussaniy[1]

1. University of Baghdad, Iraq

This article tackles a genuinely practical problem—how to perform Gosper-style arithmetic directly on continued fractions without getting stuck in non-terminating “ingest forever” loops—and it does so with a clear conceptual move: separating the *mathematical CF term sequence* from an *internal interval (bounds) representation* so the algorithm can always emit either a determined next term or a tightening bound, which is a solid correctness-oriented idea; however, the main weaknesses are that the paper reads more like an extended technical note than a fully validated research article because it gives limited formal guarantees (e.g., explicit theorems/lemmas with precise conditions for convergence/termination, correctness of bounds propagation, and handling of denominator sign/zero-crossing cases in the range computations), provides minimal empirical evaluation (no performance benchmarks vs. alternative CF-arithmetic methods, no complexity discussion for coefficient blow-up beyond qualitative remarks, and no stress-testing on hard cases like near-integer outputs or long periodic inputs), and the presentation could be tightened (some long algebraic walkthroughs could be replaced by sharper invariants, clearer pseudocode, and a small suite of worked examples with verified outputs); to improve, the author should add a concise “results/guarantees” section with formal statements and proofs (or proof sketches) for: (1) correctness of produced terms/bounds, (2) monotone tightening of intervals, (3) conditions preventing denominator sign changes in the min/max evaluation (and what to do when sign changes are possible), plus a clearly specified extraction procedure for an ε-approximation; then include an evaluation section with runtime/memory data from the Haskell implementation, comparisons against at least one prior approach (e.g., classical convergents-based arithmetic or Lester-style methods), and a curated benchmark set (quadratic irrationals, transcendental CF prefixes like π, near-cancellation cases, and rational edge cases), finishing with implementation details that make the method reproducible (exact rational type used, coefficient-growth mitigation strategy, and tests confirming outputs).

doi.org/10.32388/LEAHVF

Declarations

Potential competing interests: No potential competing interests to declare.