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Simplification of Calculations for Repeating Decimal Fractions Using a Direct Method

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INTRODUCTION & OBJECTIVE

Introduction:

Traditional methods require fraction conversion and multi-step procedures.

Objective:

To simplify direct computations on repeating decimals.

SYNCHRONIZATION CASES

- Equal Periods
- Digit Extension
- Cyclic Shifts
- LCM Expansion
- Compound Alignment

1. $0.23 + 0.4\overline{286} \rightarrow 0.23\overline{00} + 0.4\overline{286}$

2. $0.41\overline{24} - 0.1\overline{23} \rightarrow 0.41\overline{244} - 0.12\overline{323}$

PROPOSED DIRECT METHOD

Core Concept:

Repeating periods are synchronized before direct computation.

$$\begin{array}{r} 0.\overline{32} \\ +\ 0.2\overline{51} \\ \hline \end{array}$$

$$\downarrow$$

$$\begin{array}{r} 0.3\overline{23} \\ +\ 0.2\overline{51} \\ \hline 0.5\overline{74} \end{array}$$

Advantages:

No fraction conversion; maximizes speed with 100% accuracy.

FUTURE WORK

- Multiplication methods
- Python/C++ tools

REFERENCES

1. A. Y. Khinchin, Continued Fractions, 1964
2. H. Davenport, The Higher Arithmetic, 2008