

# NUMERICAL METHODS FOR A NONLOCAL CONSERVATION LAW

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**ABSTRACT.** We consider a nonlocal scalar conservation law proposed by Andrew C. Fowler to describe the dynamics of dunes. This model involves a nonlocal term which can be seen as an anti-diffusive fractional differential operator. We propose a numerical procedure based on splitting methods to approximate the solutions of this equation. We prove the convergence of the well-known Lie formula and we use the split-step Fourier method to approximate the continuous problem. Numerical experiments confirm the theoretical results.

**Keywords:** Nonlocal operator, operator splitting, split-step Fourier method, stability, error analysis.

**Mathematics Subject Classifications (2010):** 65M15

## REFERENCES

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Lecture notes: <http://www2.maths.ox.ac.uk/~fowler/courses/mathenvo.html>.

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