

# Automated Market Makers

## Analyzing the Push-and-Solve Algorithm for Uniswap v3 Clones

Edoardo Pandolfo

Advisor: Prof. Martino Grasselli

May 26, 2026 11:00 Room

### Abstract

This presentation introduces the fundamental concepts of Decentralized Finance (DeFi), with a specific focus on the mechanics of Automated Market Makers (AMMs). In particular, we analyze the structure and mathematical model of Uniswap v3, currently the most widespread and influential AMM protocol. This foundational overview serves as the necessary context to present and explore the paper [1].

While the proliferation of Uniswap clones has led to significant capital fragmentation, current off-chain aggregators used to route trades often suffer from "temporal slippage" due to the latency between path calculation and final execution. To address this, we explore the paper's novel "push-and-solve" algorithm, designed for optimal order splitting directly on-chain. By formalizing AMMs as Price-Parametrized building blocks (PPMs), the algorithm leverages convex optimization to efficiently identify a unique global clearing price across multiple liquidity sources. This mathematically elegant and "query-minimal" framework is suited for smart contract implementation. Finally we analyze its practical impact on slippage reduction and its current limitations.

### References

- [1] Vincent Danos, Leo Murao Watson, Hamza El Khalloufi, Santiago Valencia. On-chain optimal aggregation of Uniswap v3 clones. 2024. ⟨hal-04800479v2⟩ <https://hal.science/hal-04800479/document>

- [2] Hayden Adams, Noah Zinsmeister, Moody Salem, River Keefer, and Dan Robinson. Uniswap v3 core, March 2021.
- [3] Guillermo Angeris, Hsien-Tang Kao, Rei Chiang, Charlie Noyes, and Tarun Chitra. An analysis of uniswap markets. arXiv preprint arXiv:1911.03380, 2019.