

## Tracking Collective Cell Motion by Topological Data Analysis

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We develop an active vertex model to simulate confluent cellular monolayer spreading [1]. Cells are subject to inertial forces and to active forces that try to align their velocities with those of neighboring ones [5]. In agreement with experiments in the literature [2], the spreading test exhibits formation of fingers in the moving interfaces, there appear swirls in the velocity field, and the polar order parameter and the correlation and swirl lengths increase with time. Numerical simulations show that cells inside the tissue have smaller area than those at the interface [1], which has been observed in recent experiments [4]. Mixing or segregation of different cell types depends on the junction tensions between different cells. We reproduce the experimentally observed antagonistic migration assays [3] by assuming that a fraction of cells favor mixing, the others segregation, and that these cells are randomly distributed in space. To characterize and compare the structure of interfaces between cell types or of interfaces of spreading cellular monolayers in an automatic manner, we apply topological data analysis to experimental data and to results of our numerical simulations [1].

### References

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