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In this talk we derive new evolution equations for the active scalar problem in 2D for the case when all scalars lie on a 1D curve, analogous to the Birkhoff-Rott equation for 2D vorticity. The new equations are Lagrangian and valid for nonlocal kernels  $K$  that may include both a gradient and an incompressible term. We develop a numerical method for implementing the model which achieves second order convergence in space and fourth order in time. We simulate several classic vortex sheet examples (in the case of a purely incompressible kernel) and the collapse of delta ring solutions (in the case of a pure gradient kernel) and find excellent agreement with our new model. We then analyze two examples that include both incompressible and gradient parts, the first is a model for superfluids and the second a model for collective biological motion and discuss the results. (Received September 18, 2010)