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The interaction equation near attracting manifolds

We study the existence and uniqueness of solutions to the interaction equation on manifolds, where the velocity is the projection of the Euclidean velocity onto the tangent space of the manifold. For the uniqueness, a stability estimate can be obtained under the assumption that the manifold be of positive reach. For the existence, we approximate the interaction energy on the manifold by the classical full-space interaction energy to which we add a confinement part which is proportional to the distance to the manifold and which blows up as a parameter epsilon tends to 0. This ensures that any mass living near the manifold gets attracted towards it as epsilon vanishes. We use the Sandier-Serfaty approach to show that, in the limit as epsilon goes to 0, the gradient flow in the full space converges to the gradient flow on the manifold. This is ongoing work with D. Slepcev.