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**William H Mitchell\*** ([whmitchell@math.wisc.edu](mailto:whmitchell@math.wisc.edu)) and **Saverio Spagnolie**. *Viscous erosion and generalized traction integral equations.*

Motivated by problems in sedimentation and erosion, we derive a new boundary integral formulation for computing surface tractions in several Stokes flow problems, in particular for problems with a non-trivial background flow and/or a no-slip plane wall. The associated integral operators enjoy the conditioning advantages of second kind integral equations while avoiding the traditional obstacles of hypersingularity and rank deficiency. We use this formulation to study the erosion of immersed particles according to a model relating the local ablation rate to the local shear stress. In several flow configurations we find the emergence of distinct limiting body shapes involving sharp corners and ridges. These numerical results compare favorably with analytical predictions from a reduced-order model. (Received September 15, 2016)