Critical points and dynamical properties of Green's functions on open surfaces

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Abstract. The goal of this talk is to review some recent results on the dynamics of vector fields given by the gradient of Green's functions on open surfaces [1, 2]. This dynamical approach enables us to show that these fields induce an invariant decomposition of the surface as the union of a disk and a 1-skeleton that encodes the topology of the surface. We analyze the structure of this 1-skeleton, thereby obtaining, in particular, a topological upper bound for the number of critical points a Green's function can have on surfaces of finite type. Connections between the dynamical properties of the gradient field and the conformal structure of the surface will also be discussed, as well as some interesting examples of surfaces of infinite topological type.

References

[1] Enciso, E.; Peralta-Salas, D. Critical points of Green's functions on complete manifolds. *J. Differential Geom.* **92** (2012), 1–29.

[2] Enciso, E.; Peralta-Salas, D. Gradient dynamical systems on open surfaces and critical points of Green's functions. ArXiv:1304.1652.