

CIRCULAR GRAPHS, PLANAR GRAPHS AND THE EULER CLASS

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Which 4-manifolds can arise as the total space of a complete foliated plane bundle over a surface? Equivalently, what is the homological classification of actions of a surface group by homeomorphisms on the plane? We concentrate on oriented surface and orientation-preserving homeomorphisms, and give a complete homological classification in every degree of smoothness. For surfaces of higher genus, every homological possibility is realized, for any degree of smoothness. Similarly, for surfaces of genus 1, every homological possibility is realized for C^0 actions. But for C^1 or smoother actions, a surprising rigidity phenomenon manifests, and the actions are all homologically trivial.

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