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Open book foliation and incompressible surfaces

An open book foliation is a generalization of Birman-Menasco's braid foliation theory adapted to general open book decompositions and closed braids of 3-manifolds. This method is useful to study contact structures of 3-manifolds. In this talk, we give a topological application of open book foliation techniques: We provide an estimation of the genus of essential surfaces in open books, in terms of its monodromy. This provides a purely algebraic criterion for 3-manifolds to be irreducible or atoroidal. In particular, it gives a relationship between topology of 3-manifolds and left-orderings of mapping class groups. This is a joint work with Keiko Kawamuro (Univ. Iowa).