Fast Nielsen-Thurston Classification

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In joint work with Dan Margalit, Sam Taylor and Balazs Strenner, we show that the Nielsen-Thurston classification problem can be solved in quadratic--time. That is, we give a quadratic--time algorithm which determines whether a mapping class is periodic, pseudo--Anosov or reducible. If the mapping class is periodic the algorithm calculates the order; if it is pseudo-Anosov it calculates the invariant foliations and the stretch factor; and if it is reducible it calculates the reducing curves, stretch factors and the invariant foliations of pseudo--Anosov components.