Bestvina, Mladen; **Feighn, Mark**; **Handel, Michael**

The Tits alternative for Out(F_n). I: Dynamics of exponentially-growing automorphisms. (English) Zbl 0984.20025

Ann. Math. (2) 151, No. 2, 517-623 (2000).

A group satisfies the Tits alternative if each of its subgroups either contains a free subgroup of rank two or is virtually solvable. The Tits alternative is satisfied by finitely generated linear groups [*J. Tits*, J. Algebra 20, 250-270 (1972; Zbl 0236.20032)] and mapping class groups of surfaces [*N. V. Ivanov*, Dokl. Akad. Nauk SSSR 275, 786-789 (1984; Zbl 0586.20026), *J. McCarthy*, Trans. Am. Math. Soc. 291, 583-612 (1985; Zbl 0579.57006)].

In a series of two papers the authors prove that the outer automorphism group Out(F_n) of a free group of rank n satisfies the Tits alternative. In a third paper the authors show that a solvable subgroup of Out(F_n) has a finitely generated free Abelian subgroup of index at most 3^{5n^2}.

In this first paper the authors outline the contents of all three papers and provide the general framework for the subject ("relative train tracks", "attracting laminations"). The main theorem of this paper is the following: Suppose that H is a subgroup of Out(F_n) that does not contain a free subgroup of rank 2. Then there is a finite index subgroup H_0 of H, a finitely generated free Abelian group A, and a map $\Phi\colon H_0 \to A$ such that every element of Ker(Φ) has polynomial growth and unipotent image in GL($n, \mathbb{Z}$).

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MSC:

20F28	Automorphism groups of groups
57M07	Topological methods in group theory
20E36	Automorphisms of infinite groups
20E07	Subgroup theorems; subgroup growth
20E05	Free nonabelian groups

Keywords:

train tracks; attracting laminations; Tits alternative; outer automorphism groups; free groups; free subgroups; subgroups of finite index

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