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On a conjecture of Karass and Solitar

Karass and Solitar proved in the late 60s that a finitely generated subgroup of a free group has finite index if and only if it intersections non-trivially each non-trivial normal subgroup. They conjectured that the analogous result would hold for free products of non-trivial groups.

We prove the stronger statement that if A, B are non-trivial groups and H is a subgroup of $A * B$ of finite Kurosh rank, then H is finite index if and only if it intersects non-trivially every non-trivial normal subgroup of $A * B$.

The proof is based on the small cancellation theory/Stallings graph proof of the Karass and Solitar theorem for free groups found by Arzhantseva and by Ivanov/Schupp. Here we replace Stallings graphs by an appropriate notion of the core of a covering space in the setting of subgroups of free products.