The conjugacy problem for some automorphisms of free groups, through suspensions

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Abstract: We investigate the conjugacy problem for certain automorphisms of free groups. This is about algorithmically detecting whether two given automorphisms of a finitely generated free group F_n are conjugated in $\mathrm{Aut}(F_n)$ or $\mathrm{Out}(F_n)$. We consider this problem through the isomorphism problem between the corresponding semi-direct products. When these semidirect products are hyperbolic, we can turn the conjugacy problem into a combination of isomorphism problem and orbit problem for the automorphism group of one of the semidirect products. The second aspect requires some insight from the theory of JSJ decompositions of hyperbolic groups. When the semidirect products are relatively hyperbolic, we can still apply a similar strategy in the "good" cases.