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Irreducibility of the space of cyclic covers of algebraic curves of fixed numerical type and the irreducible components of $\overline{\mathfrak{M}}_g$

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We prove irreducibility for the space of cyclic covers of fixed numerical type between smooth projective curves, and also for the space of cyclic covers of prime order and of fixed numerical-combinatorial type between moduli-stable projective curves. As an application we describe the irreducible components of the singular locus of the compactified moduli space of curves $\overline{\mathfrak{M}}_g$, extending the work of Cornalba, who described the irreducible components of the singular locus of the moduli space of curves \mathfrak{M}_g .

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