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**Isomorphism Classes of Hyperelliptic Curves of Genus  
2 in Characteristic 5**

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**Abstract** The reduced equations for the hyperelliptic curves of genus 2 over finite fields of  $5^m$  elements, are given. Moreover, the number of isomorphism classes of these curves are computed. These results are relevant for the genus-2 hyperelliptic curve classification and have applications to cryptography.