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# The global solutions of algebro-geometric type for Degasperis-Procesi hierarchy

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Though completely integrable Camassa-Holm (CH) equation and Degasperis-Procesi (DP) equation are cast in the same peakon family, they possess the second- and third-order Lax operators, respectively. From the viewpoint of algebro-geometrical study, this difference lies in hyper-elliptic and non-hyper-elliptic curves. The non-hyper-elliptic curves lead to great difficulty in the construction of algebro-geometric solutions of the DP equation. In this paper, we derive the DP hierarchy with the help of Lenard recursion operators. Based on the characteristic polynomial of a Lax matrix for the DP hierarchy, we introduce a third order algebraic curve  $\mathcal{K}_{r-2}$  with genus  $r-2$ , from which the associated Baker-Ahliezer functions, meromorphic function and Dubrovin-type equations are established. Furthermore, the theory of algebraic curve is applied to derive explicit representations of the theta function for the Baker-Ahliezer functions and the meromorphic function. In particular, globally algebro-geometric solutions are obtained for all equations in the whole DP hierarchy.

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