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Well-posedness for the fifth-order KdV equation in the energy space

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We prove that the initial value problem (IVP) associated to the fifth order KdV equation {equation} \label{05KdV} \partial_tu-\alpha\partial^5_x u=c_1 \partial_xu\partial_x^2u+c_2\partial_x(u\partial_x^2u)+c_3\partial_x(u^3), {equation} where $x \in \mathbb R$, $t \in \mathbb R$, $u=u(x,t)$ is a real-valued function and $\alpha, \ c_1, \ c_2, \ c_3$ are real constants with $\alpha \neq 0$, is locally well-posed in $H^s(\mathbb R)$ for $s \ge 2$. In the Hamiltonian case (\textit i.e. when $c_1=c_2$), the IVP associated to \eqref {05KdV} is then globally well-posed in the energy space $H^2(\mathbb R)$.

Comments:	We corrected a few typos and fixed a technical mistake in the proof of Lemma 6.3. We also changed a comment on the work of Guo, Kwak and Kwon on the same subject according to the new version they posted recently on the arXiv (arXiv:1205.0850v2)
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