Local well-posedness for the fifth order KdV equation in Fourier-Lebesgue spaces

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We consider the Cauchy problem for the fifth-order Korteweg-de Vries equation on the real line, posed in the Fourier-Lebesgue spaces $\mathcal{F}L^{s,p}(\mathbb{R})$. Via an infinite normal form reduction and a nonlinear change of variables, we are able to transform the nonlinearities in a way that isolates the good and bad frequency regimes, obtaining a new KdV equation in which each nonlinearity is better behaved, at the expense of having to deal with an infinite number of nonlinearities and a much higher complexity in each term. By doing this, we manage to prove local well-posedness for this equation in low regularity Fourier-Lebesgue spaces via frequency-restricted estimates. By inverting the transformation, we prove the local well-posedness of the fifth-order KdV, improving upon the current best result in this direction.