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10. Partial Differential Equations

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Lanza de Cristoforis, Massimo, University of Padua, Italy

Differentiability Properties of the Autonomous Composition Operator in Sobolev Spaces

We consider the composition operator which takes a pair (f, g) of functions belonging to appropriate Sobolev spaces into its composite function $f \circ g$. We prove sufficient coditions on the space exponents and domains in order that the composition maps bounded sets into bounded sets, is continuous, and is differentiable with continuity up to order r, with $r \geq 1$. Then we show the optimality of such continuity and differentiability conditions by means of theorems of "inverse" type.

Reference: M. Lanza de Cristoforis, Differentiability Properties of the Autonomous Composition Operator in Sobolev Spaces, *Z. Anal. Anw.* **16** (1997), 631-651.