

8 kwietnia 2024 r.

Maciej Denkowski

The rise and fall of Yomdin's version of a Lipschitz Implicit Function Theorem

Opis: Recently, I have claimed to have a proof of Yomdin's version of a Lipschitz Implicit Function Theorem. However, I have just learned about two papers that add much to the drama concerning the whole story:

- firstly, the paper:

G.J. Butler, J.G. Timourian, C. Viger, *The rank theorem for locally Lipschitz continuous functions*, Can. Math. Bull., 31 (1988), pp. 217-226.

contains a Lipschitz Rank Theorem proved under a generalisation of Yomdin's condition, therefore, it implies Yomdin's Lipschitz Implicit Function Theorem; in fact the proof is very similar to my argument;

- however, Proposition 2.1 on which is based the Rank Theorem in the paper cited above is incorrect - Proposition 3.1 from the recent article:

D. Bartl and M. Fabian, *Can Pourciau's open mapping theorem be derived from Clarke's inverse mapping theorem easily*, J. Math. Anal. Appl., 497(2):124858, 2021.

gives an explicit example contradicting both the Lipschitz Rank Theorem and my main Theorem 2.5; in fact, I clearly made the same type of mistake as the authors of the aforementioned article in their Proposition 2.

Summing up, we are back to square one: Yomdin's Lipschitz Implicit Function Theorem and thus his Structure Theorem remain unproved, the same flaw makes the Lipschitz Rank Theorem an open problem and the counter-example mentioned above shows there is no hope for proving the Lipschitz Implicit Function Theorem along the lines I had hoped. I will present all this in my talk.