M-DIFFERENTIABILITY OF AN INTERNAL FUNCTION

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Topic #4: *Nonstandard Methods in Functional Analysis.*

[Joint work with Vítor Neves.]

In 1992, Reeken presented a new type of differentiability, the M-differentiability. This is a weaker type of differentiability, when compared with S-differentiability. This kind of differentiability is important in the cases where there is an infinitesimal perturbation of a standard differentiable function.

We extend his work by presenting the notion of M-uniformly differentiable functions. We prove in this case a necessary and sufficient condition for an internal function to be MU-differentiable, relating with a standard C^1 function.

The Chain Rule, Taylor's Theorem, Mean Value Theorem and an Inverse Mapping Theorem are also proved for MU-differentiability.

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