

Michigan Math Club

Thursday at 4pm in the Commons

Free Pizza and Pop



The Implicit Function Theorem

Prof. Asen Dontchev

Abstract for 2 October



The classical implicit function theorem revolves around solving an equation $f(p,x)=0$ for x in terms of p . It is a centerpiece of mathematical analysis with countless applications, but there is much more to it than usually comes to attention. In this talk, in a departure from the treatments common in textbooks, the set of all pairs (p,x) with $f(p,x)=0$ is viewed as the graph of a generally set-valued mapping S , called the solution mapping for the equation. In this context, the question is recast as whether a localization of S around a pair (p',x') in the graph of S is actually the graph of a (single-valued) function s , and, if so, what properties can be guaranteed for that function s .

The classical inverse function theorem is a special case of the classical implicit function theorem. It is, in fact, equivalent to the classical implicit function theorem, as is the classical correction function theorem. After a discussion of these results, it will be demonstrated that the differentiability assumptions can be relaxed by utilizing Lipschitz continuity.