

Re: Infintesimals

Source: <http://sci.tech-archive.net/Archive/sci.math/2004-07/0053.html>

From: Thomas Nordhaus (*thnord2002_at_yahoo.de*)

Date: 06/30/04

Date: Wed, 30 Jun 2004 19:01:47 +0200

israel@math.ubc.ca (Robert Israel) schrieb:

>>My question is: what is the opinion of other mathematicians as to the
>>existence of these types of numbers
>
>We get along quite well without them, but they are fun to play with,
>and sometimes useful.

I remember (hmm, about 20 years ago) a paper, where the existence of a limit cycle was proven for a singular perturbation problem

$$\begin{aligned} \text{Eps} * u' &= f(u) - v \\ v' &= u \end{aligned}$$

for small eps (f a cubic polynomial of u with 3 zeros).

We discussed that problem at length. Solved it the classical way by means of singular perturbation theory (matching conditions, boundary layers, "ugly" eps-delta-proofs).

The non-standard proof looked quite elegant. However we spent half of the quarter with getting the definitions and concepts right. Still, at the end, there was this "nagging" feeling: "Maybe I missed something essential?"

So, maybe we should look a little more into this theory and make it more easily accessible for "classicaly educated" mathematicians – or are there serious technical difficulties in applying this theory that I'm not aware of anymore?

Thomas