

**Review of doctoral thesis:**  
**Tymofiy V. Chagovets: Experimental Investigation of**  
**Quantum Turbulence in Superfluid  $^4\text{He}$**

Presented thesis counts 65 pages of the written text accompanied with a set of contributions that have been published in various scientific journals or proceedings and that deal with the partial problems of the topic presented in this thesis. This thesis is divided into 6 chapters accompanied with many graphs and figures that illustrate the solved problem. I think this thesis as well organized and written in a very good manner as it was easy for me to orientate myself and understand the problem well even I am not an expert in quantum turbulence at all.

The problem presented in this thesis I suppose as the very important one because the problem of classical turbulence is reported as the remnant problem of classical physics and there is a possibility that quantum turbulence could help to elucidate some features and principles of the classical turbulence. And it has to be said that turbulence is reflected in all phenomena and problems dealing with flow. This phenomenon is present and has to be solved in a wide spectrum of various activities as many engineer tasks (fuel flow in engines, for example), medicine (vascular system and blood flow) aircraft or automobile industry, shipbuilding, geophysical flow and astrophysics to mention some of them.

I think that the approach used in this thesis – experimental investigation of quantum turbulence in superfluid  $^4\text{He}$  with the emphasis given to two problems that can be met in the quantum fluid flow – steady state pure superflow and its decay is very interesting and also the important one. In this thesis has been also mentioned and described so-called B-state of the steady state pure superflow and given an phenomenological model describing it.

I can state that results reached when the author together with his colleagues worked on the described problems are very interesting and very topical.

As far as some formal remarks and comments concerns there are some clerical errors but it can be said that they do not make the text more difficult for reading. I have one question that is not only formal – there probably miss one figure in fig. 4.12 – in the text on the following page author mentions the third regime. I am not sure whether I do not understand well to what is shown on the figures or whether the figure that correspond to this third situation misses. I ask author for explaining this. Also on the fig. 4.4 there should be red squares but I do not discover any. I also ask author for comment. And finally one

recommendation – a phenomenological model for B-state has been suggested but it should be made series experiments that either confirm the validity of the model or bring some necessity to modify it. But it is necessary to carry out them.

As I have mentioned before this thesis brings many interesting information and results published there shows the author's ability for scientific career. I strongly recommend to accept this doctoral thesis for reviewing process and to evaluate it as the doctoral thesis.

In Prague, 4 July 2008

