

## HOMAGE AND FLUID HUMOUR

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### PREAMBLE

People working on Fluid Flow Problems face difficulties in formulating the physical paradigm of the natural phenomenon, transforming it to a mathematical model, handling the consequent mathematics, experimentation, interpretation.....etc.

I realized, say "its strangeness" if not its difficulty through the lucid explanation of one of my students who have been in general a sound source of education for me.

This intelligent young man was my student-assistant for Fluid Mechanics during his fourth year in Civil Engineering Department. We had very good relation and he was very enthusiastic, diligent in his responsibilities. That year he graduated and applied to Structure Group for MS degree, the area to which he had not shown any sign of interest during the academic year he was with me.

In time, it transpired that I was apparently anticipating his application to Hydraulic Group for MS degree and surely I was curious to learn the reason why he had not.

One day I met him on the alley in front of the Laboratory and asked:

*"Why you did not come to Hydraulic Group (to say the truth, I meant to me !!!) for your MS degree."*

The answer was straight:

*"Sir, when a beam deforms when loaded, I can see its deformation; but when you say that a fluid particle deforms, sorry, but I cannot see the deformation."*

Finally, he turned out to be a very good, successful and prosperous engineer.

So, the life of Fluid Dynamicists is a continuous mental struggle since almost nothing is straightforward. Sometimes the origination of a discovery or of a new theory is shared by a contemporary scientists living hundreds or thousands km away from each other. Sometimes we read

interesting disputes as to the label-name of the discovery. But if there is a dispute, these intelligent people handle the dispute with humour.

Below, there are few anecdotes which reflect the impartiality, humour and spirit of some of these great men and how they see the intricacies of some fluid flows.

At the end two interesting slides on the history of wind-tunnels.

### **Kolmogoroff Theory of Turbulence and Heisenberg.**

Von Karman writes [1]:

"After the introduction of the fundamental concept of isotropic turbulence and initiation of its study by Sir Geoffrey I. Taylor at Cambridge University in 1935, Leslie Howarth and I made some significant advances. Later, important new ideas were put forth by the Russian mathematician Andrei N. Kolmogoroff and the German physicist Werner Heisenberg. I was in Moscow in 1945 and talked over turbulence problems with Kolmogoroff. He told me about the progress he had made in statistical mechanics of turbulence; he published a paper on the subject in 1941, but it was not known until much later in Western Europe.

In the same year I went to London and repeated Kolmogoroff's story to my friend, Sir Geoffrey, who said, "this is exactly the same thing that Heisenberg tried to explain to me three months ago here in Cambridge".

And we later found out – especially after George K. Batchelor investigated the two theories closely – that Kolmogoroff's reasoning and results were almost identical with those of Heisenberg.

One man conceived the idea in Russia and the other one in Germany, both during the time in which the two countries were involved in a war for life or death."

And interesting to note: the verification of independency of these discoveries was testified by two Englishmen.

## Resistance of Undernourished Bodies .

Von Karman writes [ 2 ] :

“ In 1945 a group of American scientists were engaged in collecting German papers and documents produced during the war. The list of German papers was translated into English by an American sergeant . One of my collaborators found, in the list of papers on aerodynamics , one entitled

*Resistance of Undernourished Bodies.*

This was the sergeant's rendering of the German translation of my paper on

*Resistance of Slender Bodies “ .*

It may be recommendable to read papers in their original language.

## Karman Vortex Street .

It is known that the asymmetric ,but stable arrangement of vortices behind a cylinder in an otherwise uniform flow is known as Von Karman Vortex Street .

Von Karman writes [ 3 ] :

“..... But I do not claim to have discovered these vortices; they were known long before I was born. The earliest picture in which I have seen them is one in a church in Bologna, Italy where St. Christopher is shown carrying the child Jesus across flowing stream. Behind the saint's naked foot the painter indicated alternating vortices . Alternating vortices behind obstacles were observed and photographed by an English scientist , Henry Reginald Arnulph Mallock (1851-1933) and then by a French professor , Henri Bénard (1871-1939) . Bénard did a great deal of work on the problem before I did , but he chiefly observed the vortices in very viscous fluids or in colloidal solutions and considered them more from the point of view of experimental physics than aerodynamics. Nevertheless, he was somewhat jealous because the vortex system was connected with my name , and several times – for example , at the International Congress for Applied Mechanics held in Zurich (1926) and in Stockholm (1930) – claimed priority for earlier observation of the phenomenon . In reply I once said

*I agree that what in Berlin and London is called 'Karman Street ' in Paris shall be called 'Avenue de Henri Bénard ' .*

After this wisecrack we made peace and became quite good friends.”

This is a wonderful story .

## Turbulence Again.

Sir S. Golstein writes [ 4 ]

“It was a meeting of the British Association in London in 1932 that I remember that Lamb (Sir Horace Lamb) remarked:

*I am an old man now ,and when I die and go to Heaven there are two matters on which I hope for enlightenment. One is quantum electrodynamics and the other is the turbulent motion of fluids .And about the former I am really rather optimistic “.*

( I have quoted from memory, so do not guarantee all actual words. But the sense is correct. I have heard similar story since repeated with other names than Lamb and other times in places)

*Lamb was correct on two scores .All who knew him agreed that it was Heaven that he would go to, and he was **right** to be more optimistic about quantum electrodynamics than turbulence.”*

I sincerely hope that there are people ( perhaps not to many) who do not agree with Sir H. Lamb and Sir S. Goldstein.

## Epilogue

Homage to all great scientists of the past who have illuminated our brains , our ways and to those who are on the same path.

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## References

- [1] Theodore von Karman. Aerodynamics . Dover Publications, INC. Minneola , New York (pp: 91-92)
- [2] *ibid* . (pp: 117)
- [3] *ibid* . (pp:68-69)
- [4] Sydney Goldstein. Fluid Mechanics in the First Half of this Century. A.R.F.M ; Volume 1 pp(23), 1969. Annual Rev. INC.