L1 CAVITATION EROSION OF THE HYDRAULIC MACHINES: GENERATION AND DYNAMICS OF EROSIVE CAVITIES

Avellan, F., Dupont, P.

DISCUSSION

Question by: Schiavello, B. (Dresser Pump Division)

1. **You have observed that there is strong influence of Reynolds on the mean length of the leading edge fixed cavity. Do you think that model tests at reduced speed and cold fluid are sufficiently indicative to make conclusions and quantitative evaluation about erosion rate at real operating conditions?**

2. **Your investigation is presently regarding a single isolated blade. Are you planning to investigate row of blades in order to see e.g. effect of solidity on the generation and dynamics of the cavitating vorties?**

Answer by: Avellan, F.

1. Up to now the observation of cavity development during cavitation test are the only way to proceed even though the quantitative evaluation of erosion rate at real operating conditions is impossible.

2. Before we examine cascade flow we want to limit ourselves to the basic physics hidden in the simple 2-D and 3-D leading edge cavity development. However we agree with Bruno Schiavello that we should get as fast as possible to the flow investigation of a pump runner. Our goal is the erosion rate prediction and we hope to succeed.

Question by: Arndt, R. (University of Minnesota)

1. **Have the authors compared their results with the earlier work of Knapp, Sato, Stinebring et.al. re erosion rate is relative cavity length?**

2. **Stinebring et.al. (1979) also found a secondary zone of erosion at the leading edge of the cavity (due to cyclic cavity closure)?**

3. **Have the authors measured any cavity pulsation frequencies and correlated the data in the form of a Strouhal number?**

4. **Can the authors provide further information concerning the final stage of collapse of the vortices (i.e. in final stages do we have bubbles)?**

5. **Can you provide further details about pressure gradients under which cavity collapse occurs in the vortex generator?**

Answer by: Avellan, F.

1. Not at time, we decided to study a given geometry, and the erosion rate of this case is in progress.

2. This secondary zone of erosion can be due to the reentrant jet instability which occurs for thick cavity at strong flow incidence angle, in one case we did not observe such a instability.

3. Yes from the observation we can detect already a regular distribution of transient cavities but it is difficult to measure the convective velocity

of these cavities, we are performing spectral analysis and I hope that we can provide detailed information on that subject sooner.

4. In a previous work [ref. 7] we provided time evolution of both the height and the radius of the cavity during the last stage of the collapse and we observed a trend to spherical symmetry.

5. The back pressure is about 6 atmosphere fig 7 of [ref. 7].

Volume instability of the main cavity

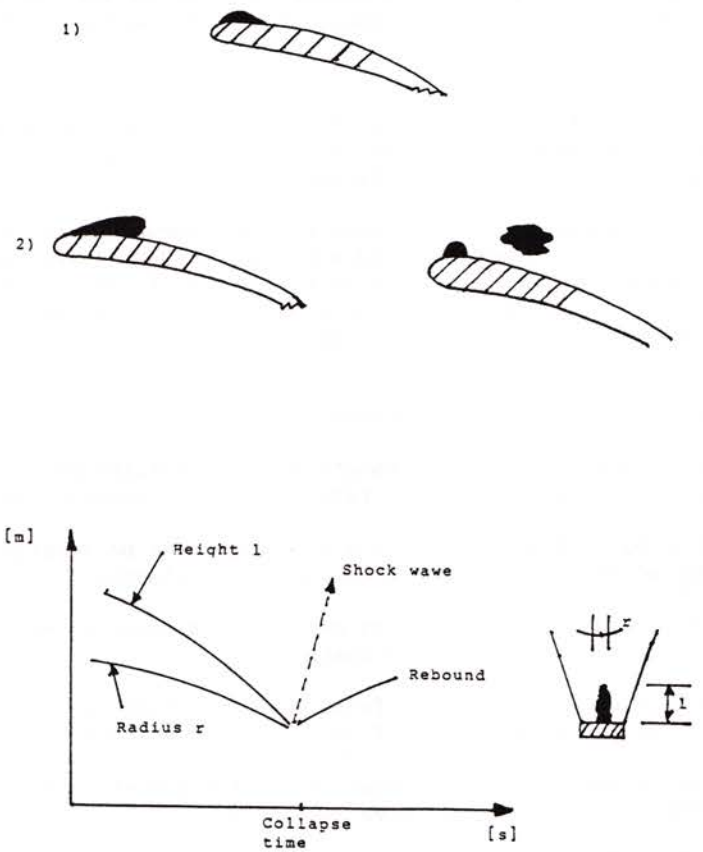

Fig. from (ref. 7) Avellan F. and Karimi A. 1987