Effect of Cavitation

Franz *et al.* (1990) (see also Brennen *et al.* 1988) have made measurements of the radial forces for the

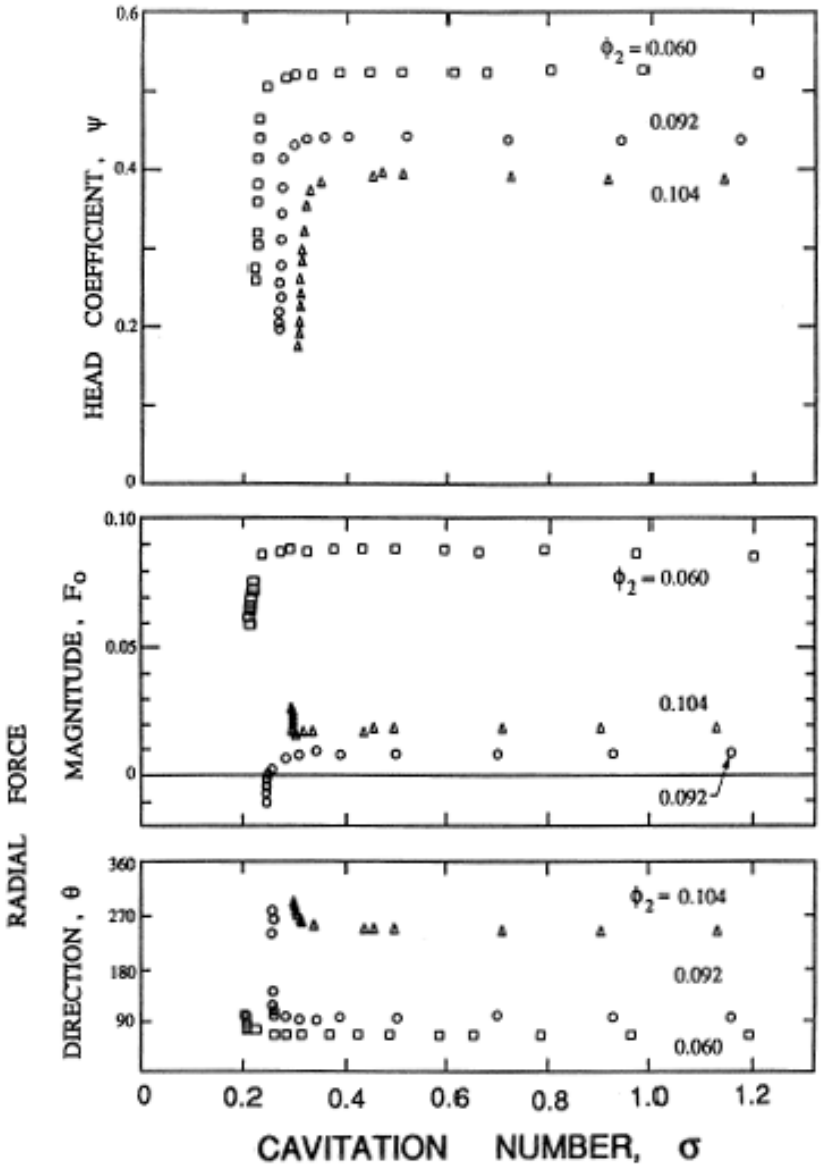

Figure 1: Variation of the head and radial force (magnitude, F_0, and direction, θ, measured from the cutwater) with cavitation number, σ, for Impeller X/Volute A at three flow coefficients and at 3000 *rpm* (from Franz *et al.* 1990).

Impeller X/Volute A combination under cavitating conditions. These studies show that any loss of head can also cause major changes in the magnitude and direction of the radial force. This is illustrated in figure 1, where the cavitation performance is juxtaposed with the variation in the radial forces for three different flow coefficients. Note that the radial force changes when the head rise across the pump is affected by cavitation. Note also that the changes in the radial forces are large, in some instances switching direction by 180° while the flow rate remains the same. This result may be of considerable significance since pumps operating near breakdown often exhibit fluctuations in which the operating point moves back and forth

over the knee of the cavitation performance curve. According to figure 1, such performance fluctuations would result in large fluctuating forces that could well account for the heavy vibration and rough running that is usually manifest by a pump operating under cavitating conditions.