STUDY ABOUT FLOW RATE OF IMPELLERS USED FOR ACHIEVEMENT OF SOLID PARTICLE SUSPENSIONS

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Abstract: *A new mathematic model for the flow rate of the impellers with axial discharge was deduced due to the methods of dimensional analysis. Through experimental determinations the general calculation relation was particularized for the case of the six 45º- pitched blade turbine. Research results are presented by graphics, depending of impeller's parameters: speed, diameter and width of blades. Experimental data are used for establishing a general relation of impeller flow rate, taking into account the liquid density and viscosity.*

Keywords: *mixing, agitation, impeller, flow rate, pitched blade turbine.*

1. Introduction

The resultant motion of liquid in a cylindrical vessel with rotational mechanical impeller can be decomposed in an axial flow, a radial flow and a tangential flow, in accordance to the rectangular system with the vertical axis in direction of the vessel revolution axis (Figure 1).

Usually, in the aim of axial and radial flow intensification, is decreased the tangential current through the use of baffles [1]. Thus, the fundamental studies considering the mixing in vessels with baffles directed to the two types of impellers: impellers with radial discharging flow pattern and impellers with axial discharging flow pattern (Figure 2).

But apart from the circulation flow of liquid, must be taking into account the turbulence which is created through the impeller action, this turbulence being characterized by highly cutting tensions. So, because the aims of mixing processes are very varied, the impeller must chose in such kind that to assure an optimum ratio between circulation and the turbulence [2, 3].

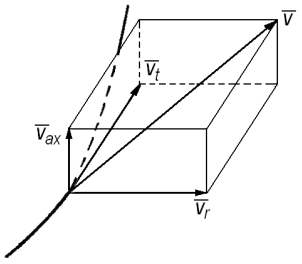
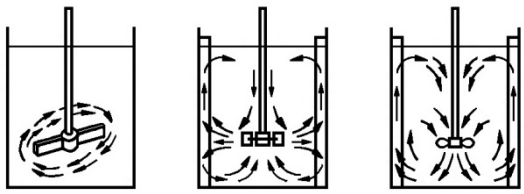


Figure 1: *The resultant speed $\bar{v}$ and his components: $\bar{v}_{ax}$ - axial speed, $\bar{v}_r$ - radial speed, $\bar{v}_t$ - tangential speed.*



-a- -b- -c-

Figure 2: *Flow pattern of mechanical rotary impellers: a) tangential; b) radial; c) axial.*

With this end in view, the impellers were classified depending on the size of ratio among the power number and the pumping number N_p/N_q: