



Master Thesis Proposal: Predicting Vortex Formation from a mechanical stirrer in a Cylindrical Vessel.

Introduction

Millipore is a Life Science company providing technologies, tools, and services for bioscience research and biopharmaceutical manufacturing. Millipore has more than 6,100 employees in 47 countries worldwide. In Sweden Millipore develop and manufacture mixers, valves, connectors and sampling systems. The Millipore NovasepticMixer® is market leader for magnetically coupled stirrers (mixers) within pharmaceutical manufacturing.

The problem

Mechanical stirred vessels are commonly used during production of drugs. Liquid base in vessel is often water. The desired flow pattern in the vessel is depending on properties of added ingredients. Controlling central vortex flow pattern is often the most important factor. When vortex is formed the transport from the surface is increased at the same time as gas is incorporated into the liquid. For some applications the increased transportation is necessary for transport ingredients from the surface to the impeller where they are dissolved. For other applications gas incorporations generates foaming which is not acceptable. Today a simple empirical method exists to predict vortex. It is based on the ratio of height/width for the vessel and the position of the impeller.

Task

Identify which parameters that control vortex formation. Evaluate which computational methods that could give support to predict vortex. Create/refine a method to predict vortex formation. The method should be used when selecting a mixer to a specific application without extensive tests or calculations. Verify the method with tests at Millipore lab.

Application

Suitable applicants are students with both knowledge and interest in fluid dynamics and mixing problems from courses in CFD and equal. The master thesis project is performed in Göteborg, (Nödinge) and covers 20 weeks of work (30 ECTS credits) and is expected to start during autumn 2008 or spring 2009.

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