
Temperature distribution in a High Shear Mixer during heating

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For some type of products, for instance, sweet chili sauce, mayonnaise and curry mango sauce, the high shear mixer works as a batch pasteurizer. During the heating process, the rotor is normally kept still, while the agitators rotate to help speed up the heating process. Due to the complexity of the machine geometry, it is very difficult to find out the coldest region of the fluid through experimental measurement. In this situation, whether the whole domain of the fluid is heated to the targeted temperature with the given heating time is hard to know. This question could be answered through computational fluid dynamics (CFD) simulation, which is investigated in this study.

The theoretical calculation when compared to experiments indicate that the steam temperature and steam heat transfer coefficient are suitable as boundary conditions for viscous products because heat transfer coefficient on the product side is the main limiting factor. From the CFD simulations, the cold region in products locates around the corner of the rotor. The temperature of both products distributes evenly during heating process, which proves that chosen agitator speed is a good enough as rotational speed for heating. Therefore, cold region should not be an issue during heating inside the high shear mixer.