Analysis and optimization of mixing inside twin screw extruders using mapping method

Sarhangi Fard Arash, Meijer Han E.H., Famili Navid M.H., Anderson Patrick D.

Recent advances in finite element modeling have made it possible to accurately determine the velocity field in twin-screw extruders operating under realistic conditions. Analysis and even optimization of mixing based on particle tracking is far from trivial since no volumetric data is available. In this work we continue on the application of the mapping method, which does provide volumetric quantities, to quantitatively compare different screw layouts and find optimal designs. The mapping method has proven its merits for static mixers where, in previous work, all popular static mixers are evaluated and guidelines have resulted to design new mixers based on either compactness of minimum pressure drop. In this work we have used to same approach to analyze mixing and we have compared several screw configurations and different types of screws. In particular, conveying elements are compared with different pitch length and gap width, while for kneading elements a variety of staggering angles have been put side by side. The flux-weighted intensity of segregation is used a mixing measure to evaluate the different screw designs.