Abstract

Two different 2D CFD models were developed to study the transport of microplastics from golf debris in order to determine the accumulation zones and predict the trajectories of microplastics using a modified convection-diffusion equation from Transport of diluted species module from COMSOL Multiphysics. A vertical transport model was developed to study the effects of buoyancy and particle size ranging from 5 mm to 1 mm on particle distribution in coastal areas using a pre-defined velocity field. This model suggested that particles with larger diameters (5 mm), whether buoyant or heavy, are more spatially distributed than particles with smaller diameters (3 mm and 1 mm). The model also predicts the particle accumulation zones located in the convergence point of eddies gyres. This result obtained from the model is consistent with the physical behavior of particles and other literature sources. A second horizontal transport model with a more complex geometry was set up to study the distribution of particles along the coastline in Carmel Bay, California. However, due to lack of data, constant velocity fields were used for this study instead. The result from the model is not consistent with the expected behavior of particles transport. It is recommended for future study, current, topographic, temperature, pressure, and salinity be used to accurately model microplastic transport in this area using a more complex geometry.