

Several kinds of random union of interacting particles is studied. We define line segment process of interacting particles in  $\mathbb{R}^2$  and process of interacting surfaces in  $\mathbb{R}^3$  as the models with density function  $p$  with respect to some Poisson point process. The formulas for moments of the geometrical characteristics of these models are derived and the limit behaviour when the intensity tends to infinity is investigated. For time extension of such models a simulation algorithm is developed. Various estimations of parameters of density  $p$ , among them those based on sequential Monte Carlo, are studied and compare in a simulation study.