

N number of birds
 m mass of a bird
 α friction parameter
 β friction parameter
 d_0, ϵ_0 parameters for S_0 the cutoff function used in R_i and A_i
 ρ_1 a (large) positive parameter
 β_1 exponent in R_i term
 d_1, ϵ_1 parameters for S_1 the cutoff function used in A_i
 $\delta_2 < \delta_1$
 S positive parameter calibrating “attraction”
 β_2 exponent in \tilde{w} term
 C lonliness coefficient in B_i term