

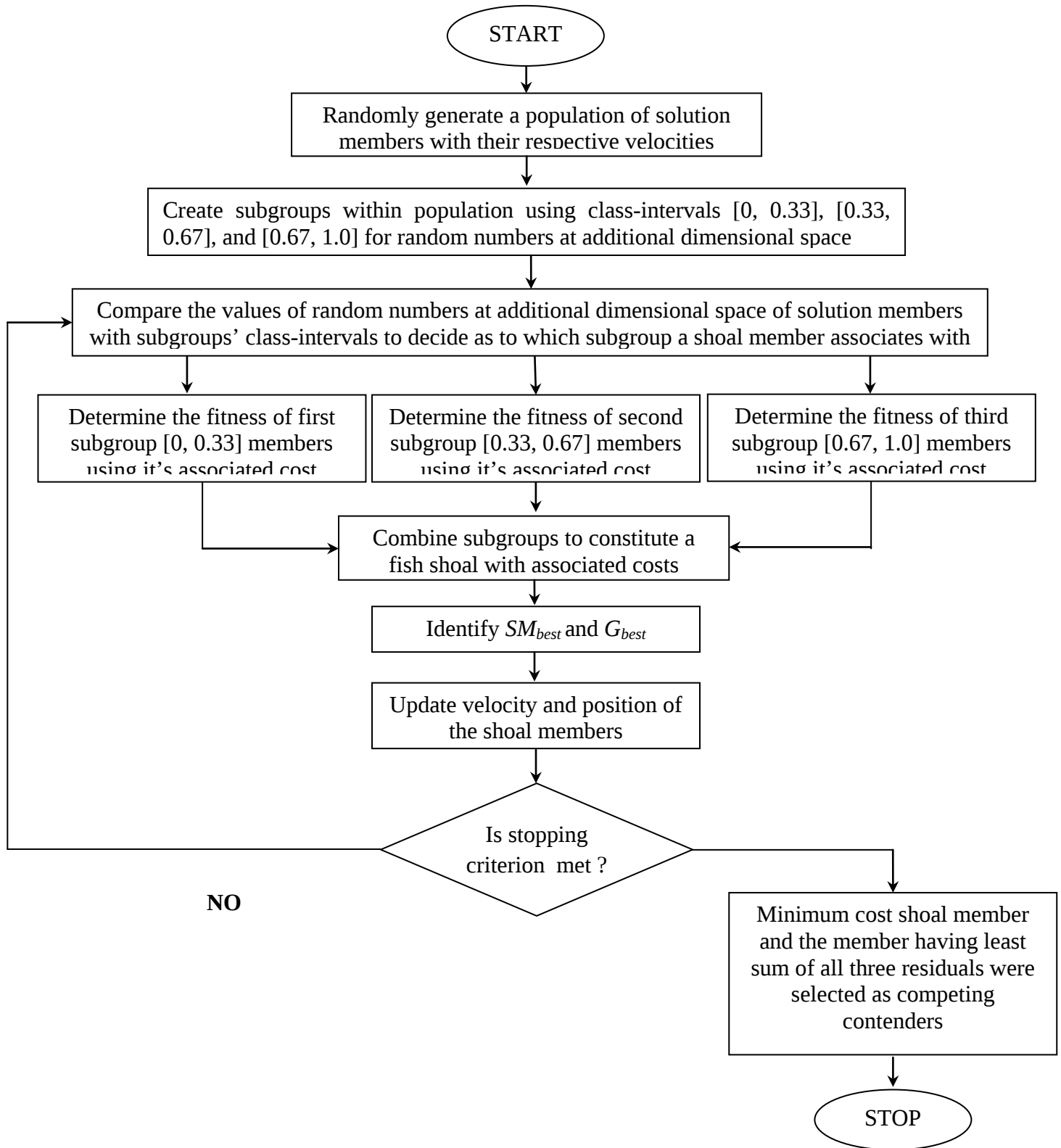


Fig 7.1 Flow chart depicting application of fish shoal optimization algorithm to the problem

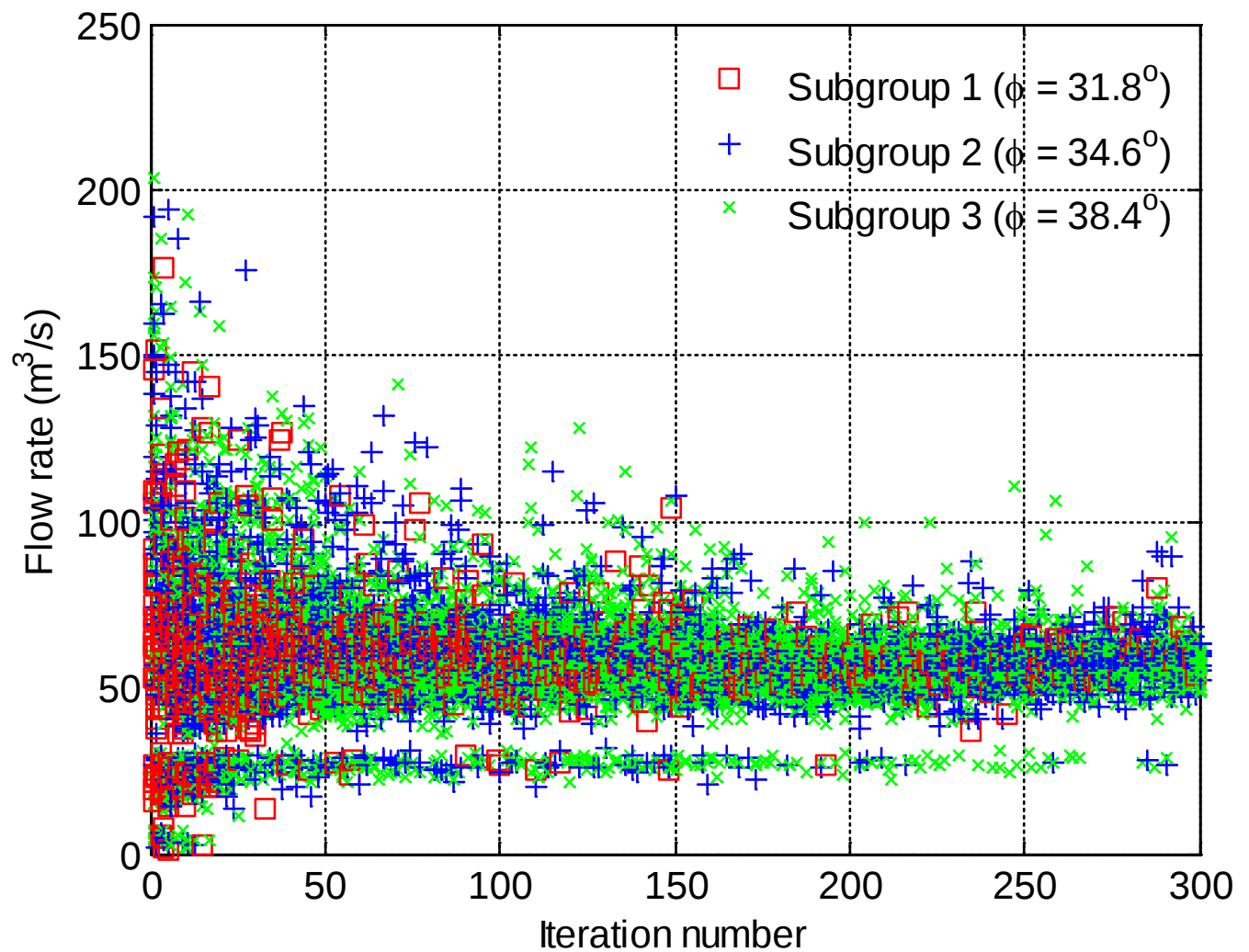


Fig. 7.2 Shoal characteristics with iterations for flow rate convergence representing involvement of members from all subgroups at each generation for canal without freeboard with parameter setting 1

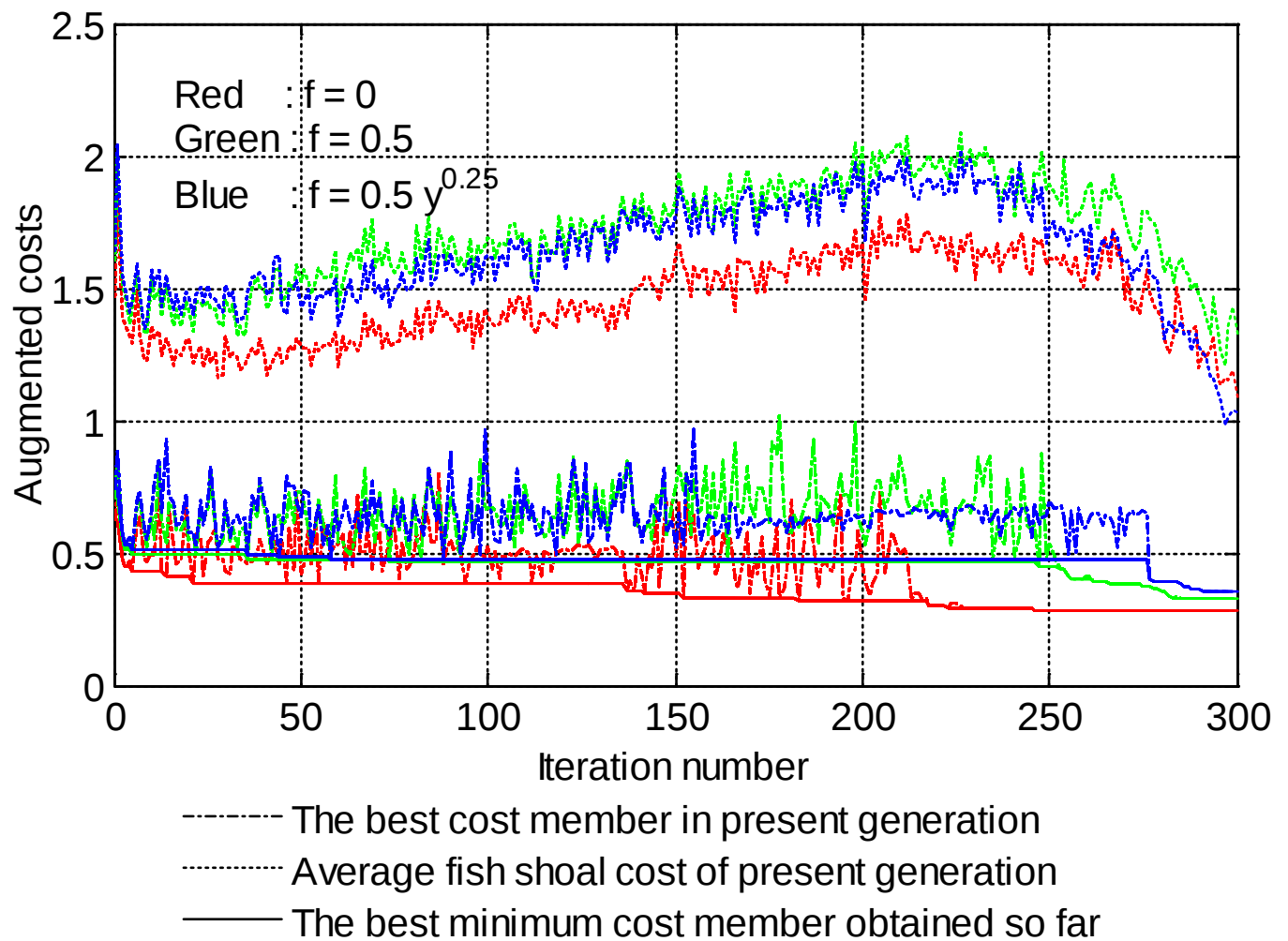


Fig. 7.3 The convergence trend of local, mean and global leader costs with iterations for three freeboard scenarios with parameter setting 1

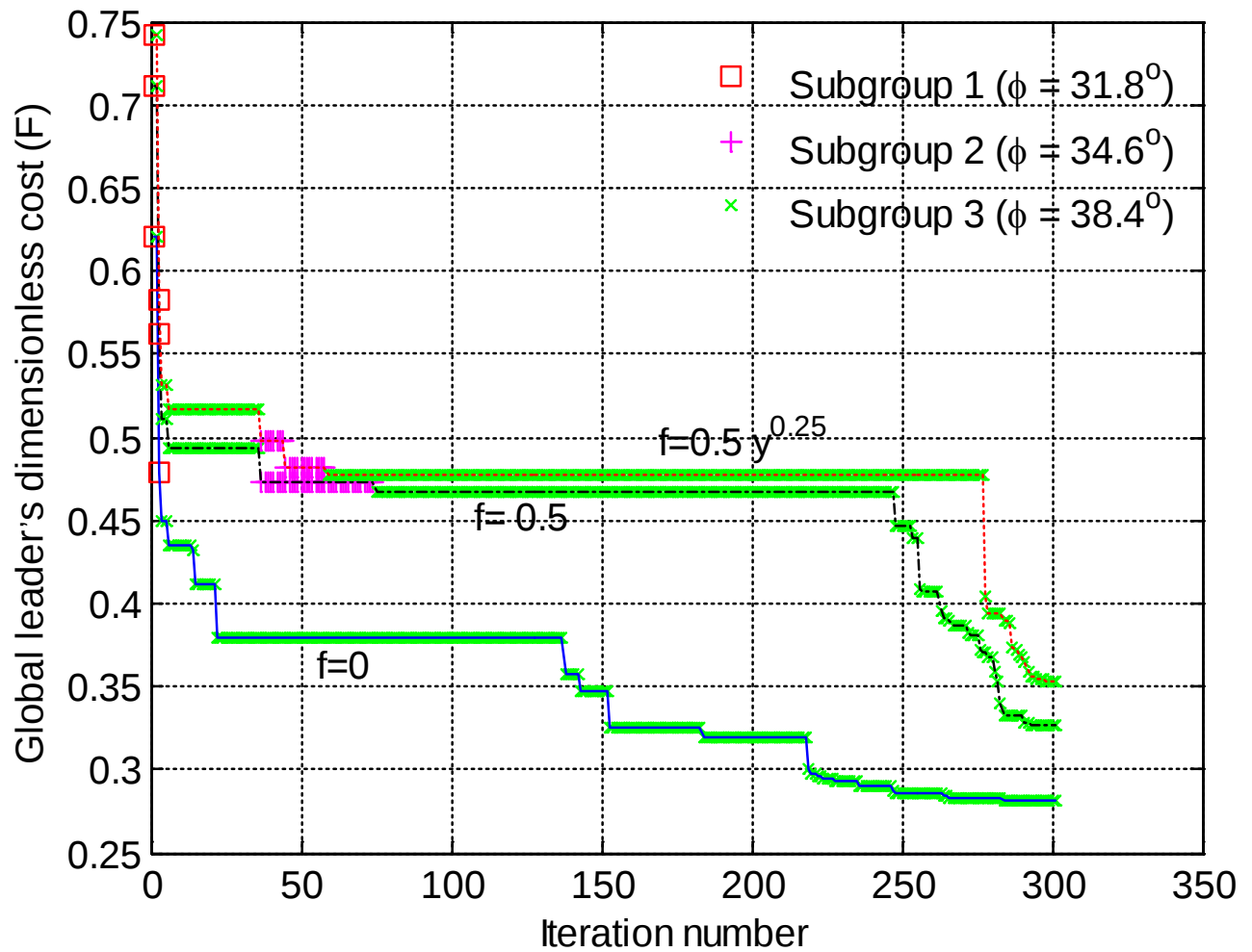


Figure 7.4 Convergence characteristics of FSO led by different global leader (minima) from various subgroups with successive iterations for three freeboard scenarios with parameter setting 1

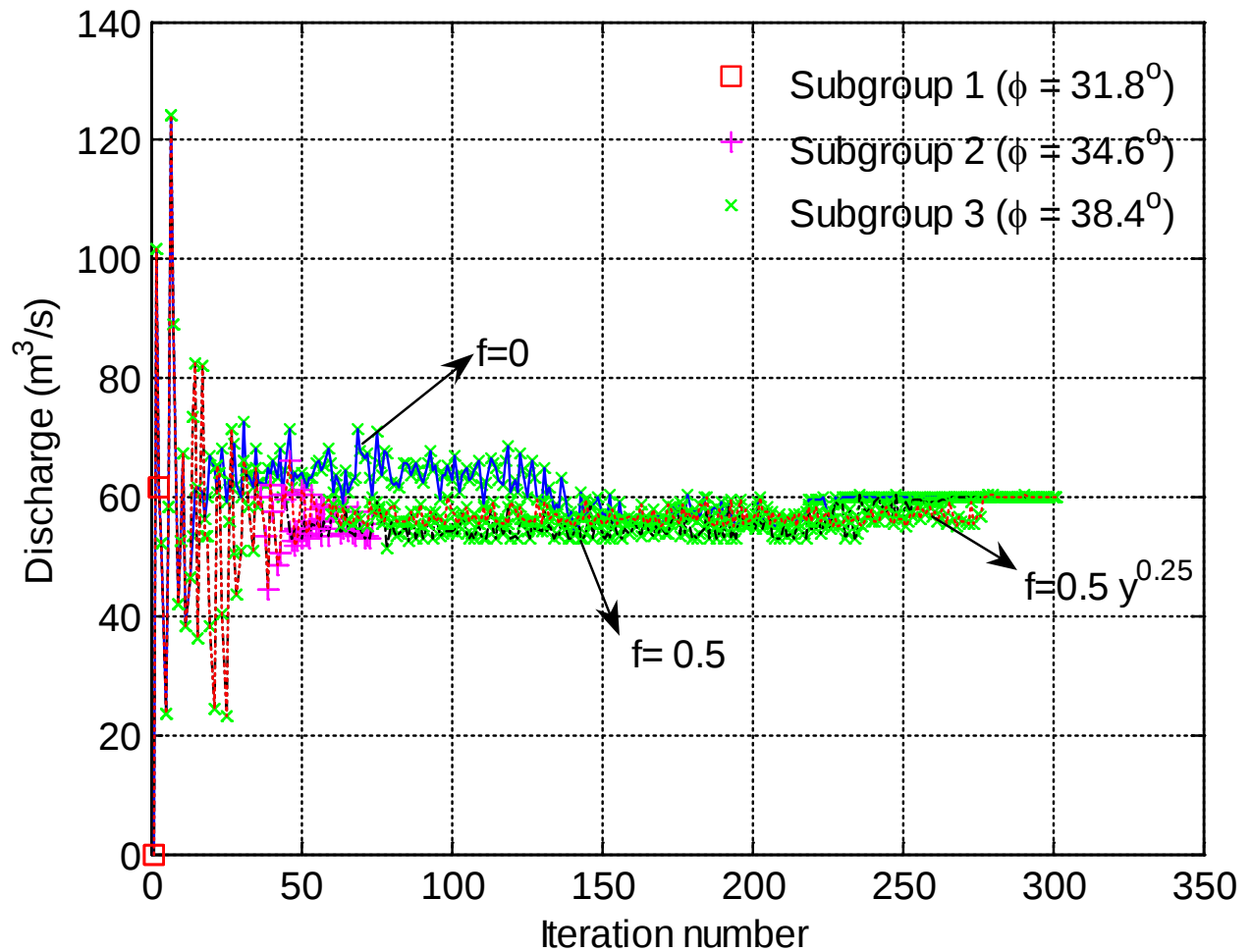


Fig. 7.5 The convergence characteristics for actual flow rate by global leaders emerging out from various subgroups with successive iterations for three different freeboard scenarios with parameter setting 1

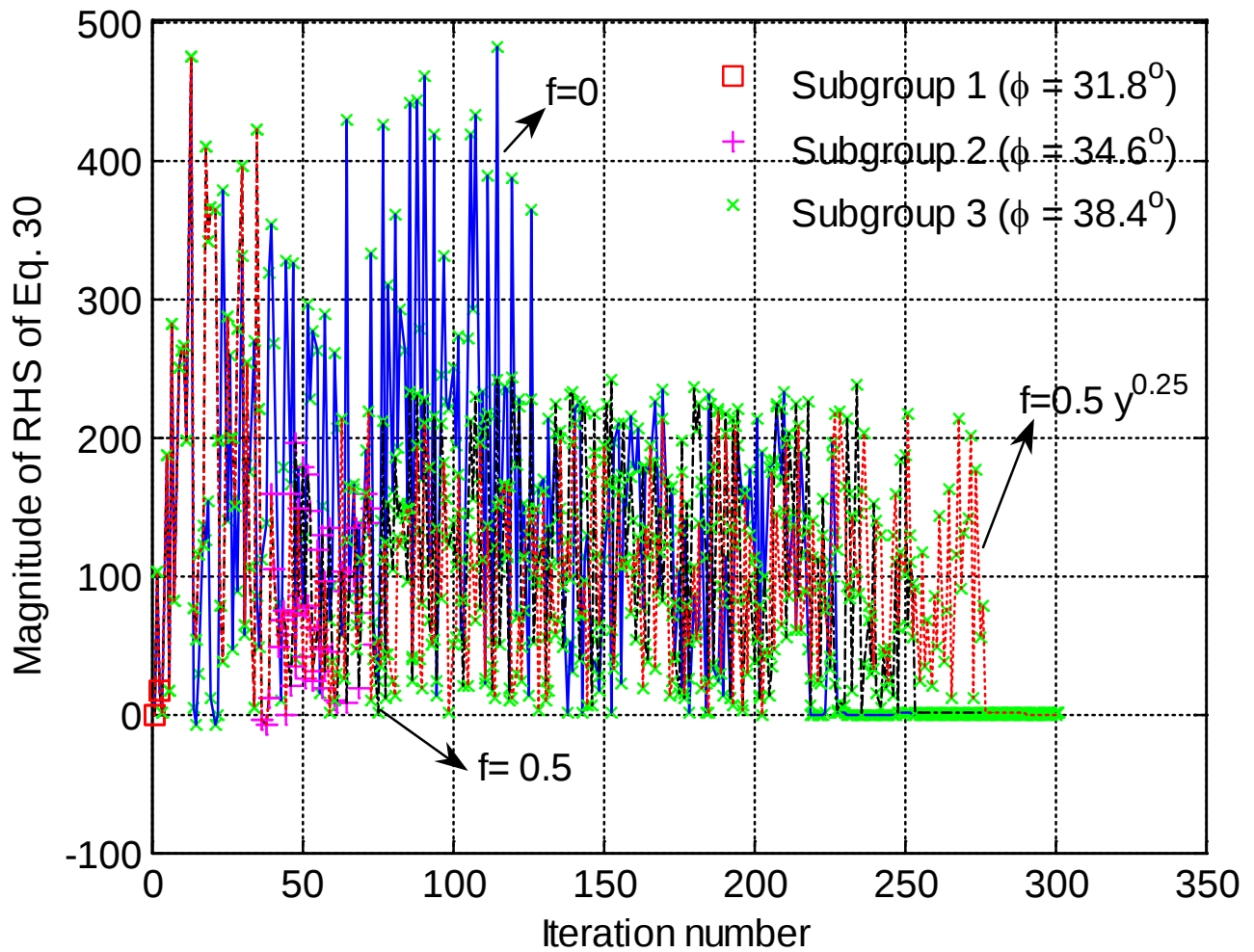


Fig. 7.6a The convergence characteristic of the actual shear stress residual due to global leaders emerging out from different subgroups with iterations for the first side slope of the canal for three different freeboard scenarios with parameter setting 1

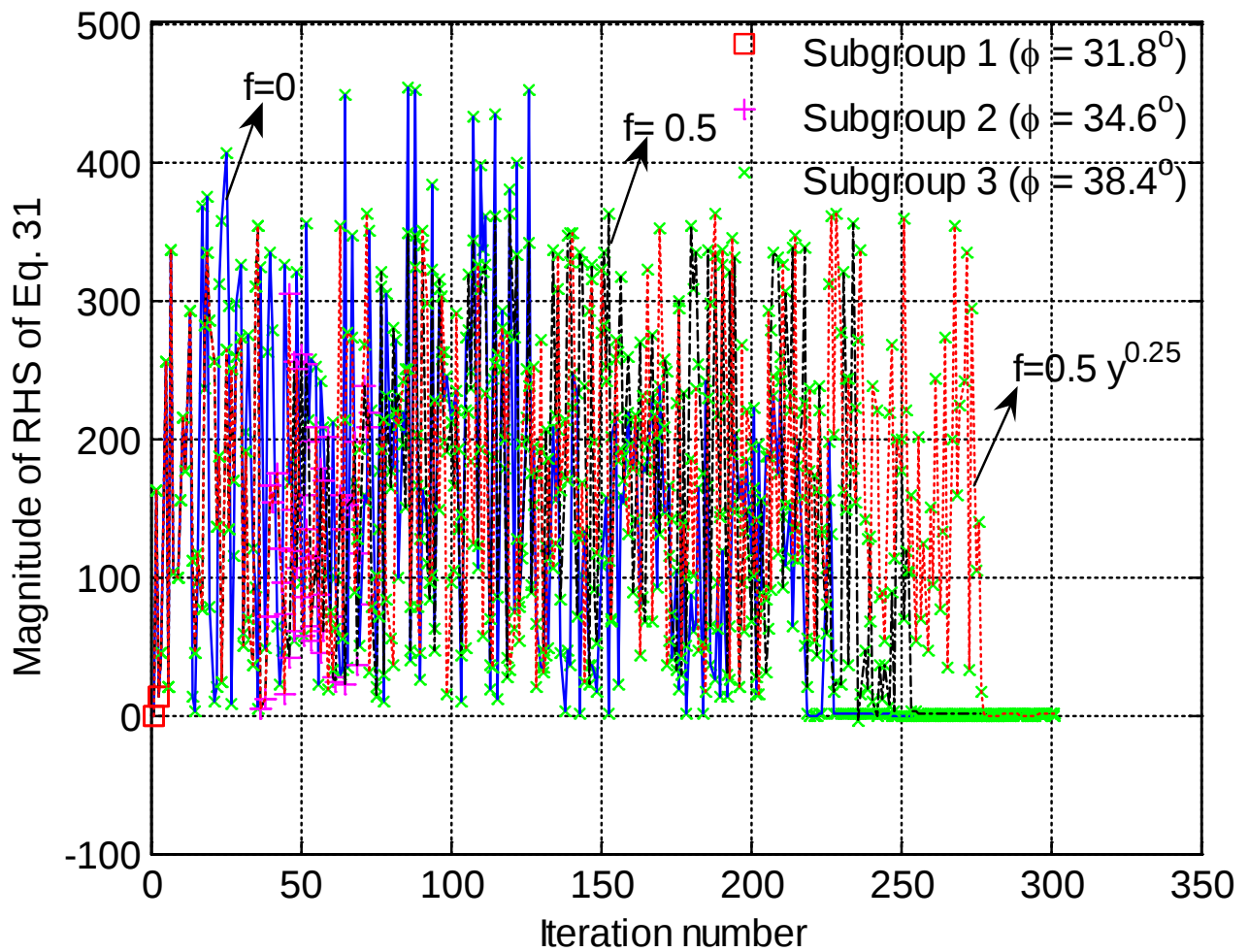


Fig. 7.6 b The convergence characteristic of the actual shear stress residual due to global leader emerging out from different subgroups with iteration number for the second side slope of the canal for three different freeboard scenarios with parameter setting 1

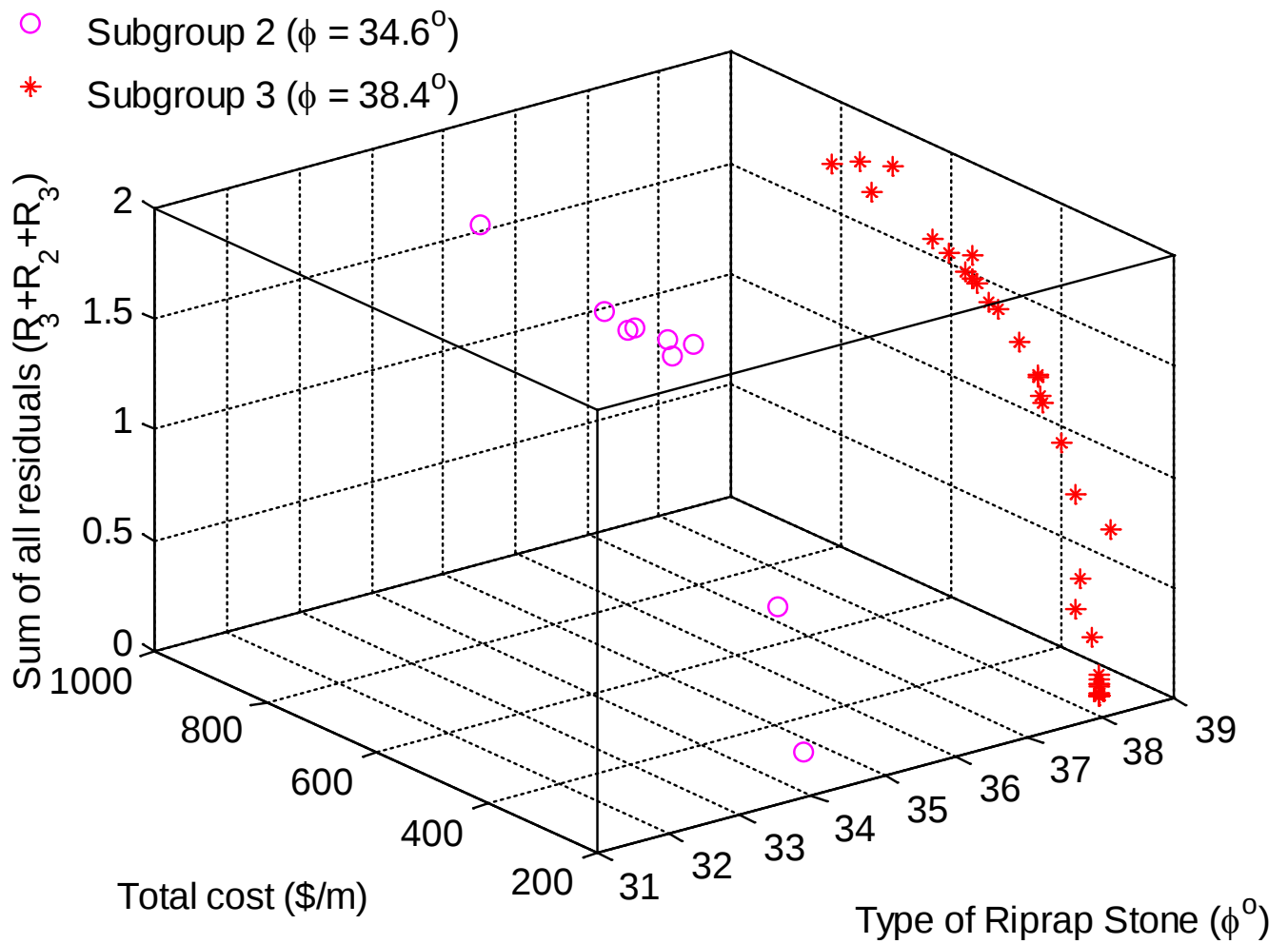


Fig. 7.7 Characteristics of the overall fish shoal after a computational run involving maximum iteration number for freeboard scenario $f = 0$ with parameter setting 1

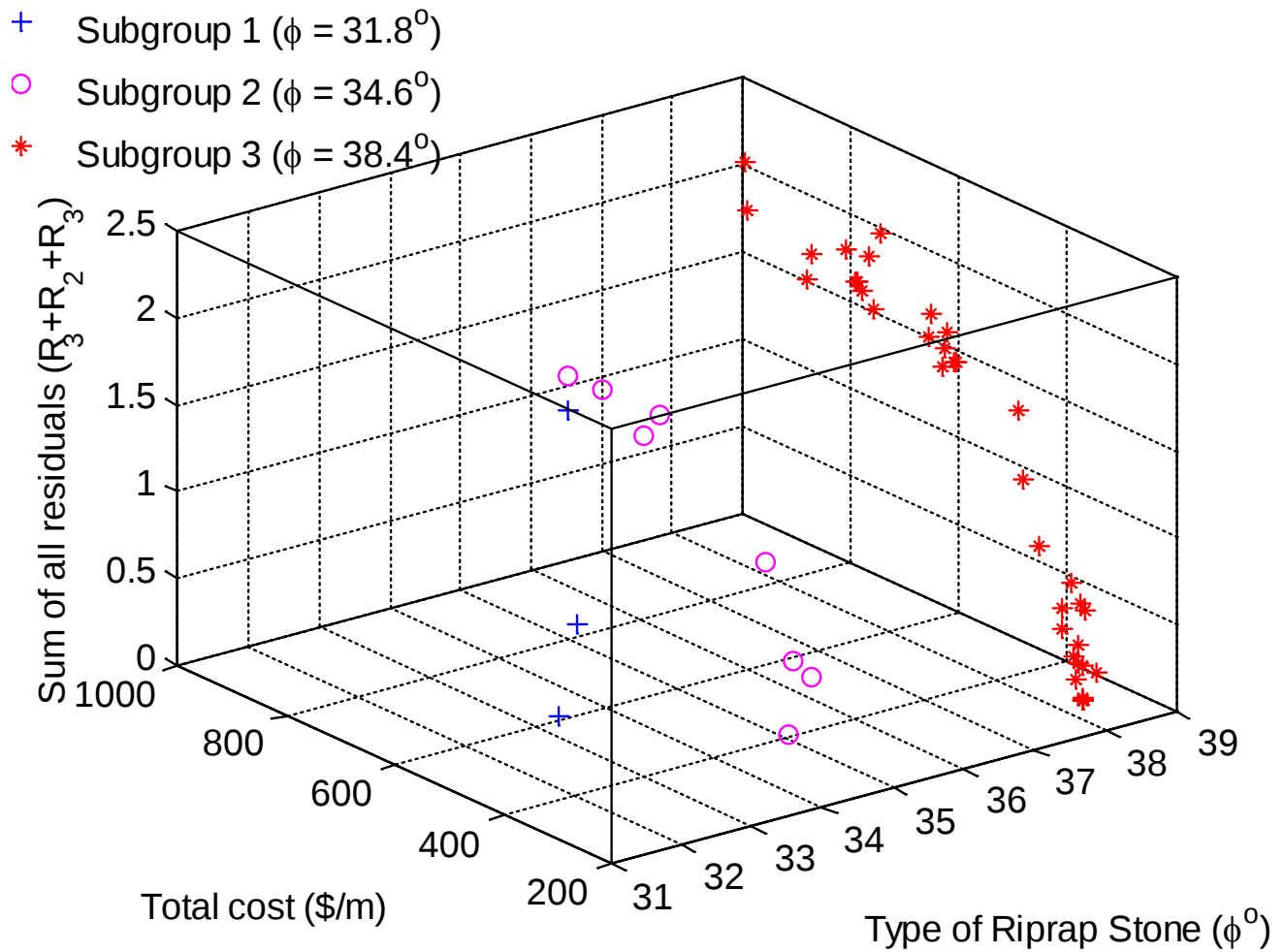


Fig. 7.8 Characteristics of the overall fish shoal after a computational run involving maximum iteration number for freeboard scenario $f = 0.5$ with parameter setting 1

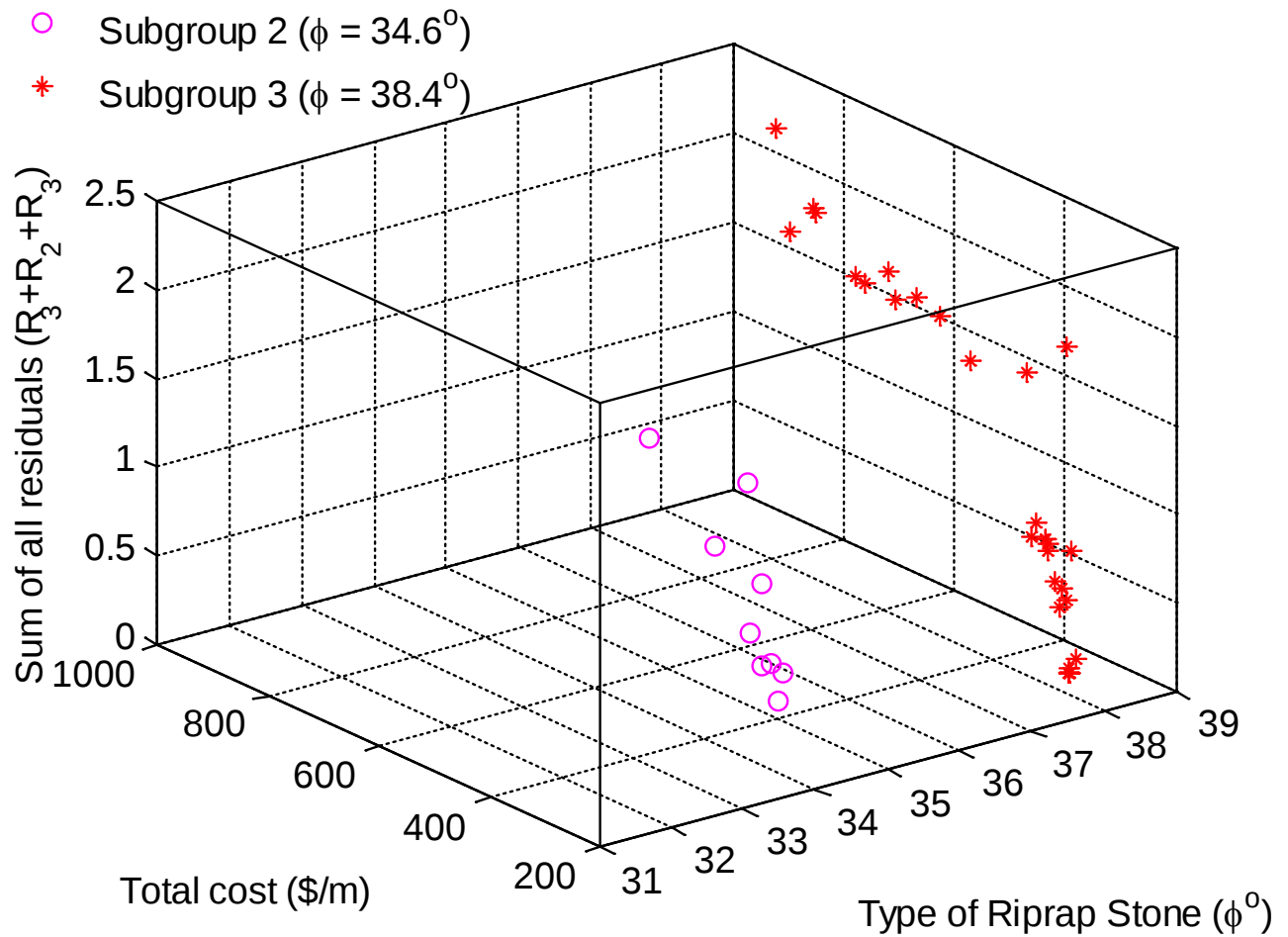


Fig. 7.9 Characteristics of the overall fish shoal after a computational run involving maximum iteration number for freeboard scenario $f = 0.5 y^{0.25}$ with parameter setting 1

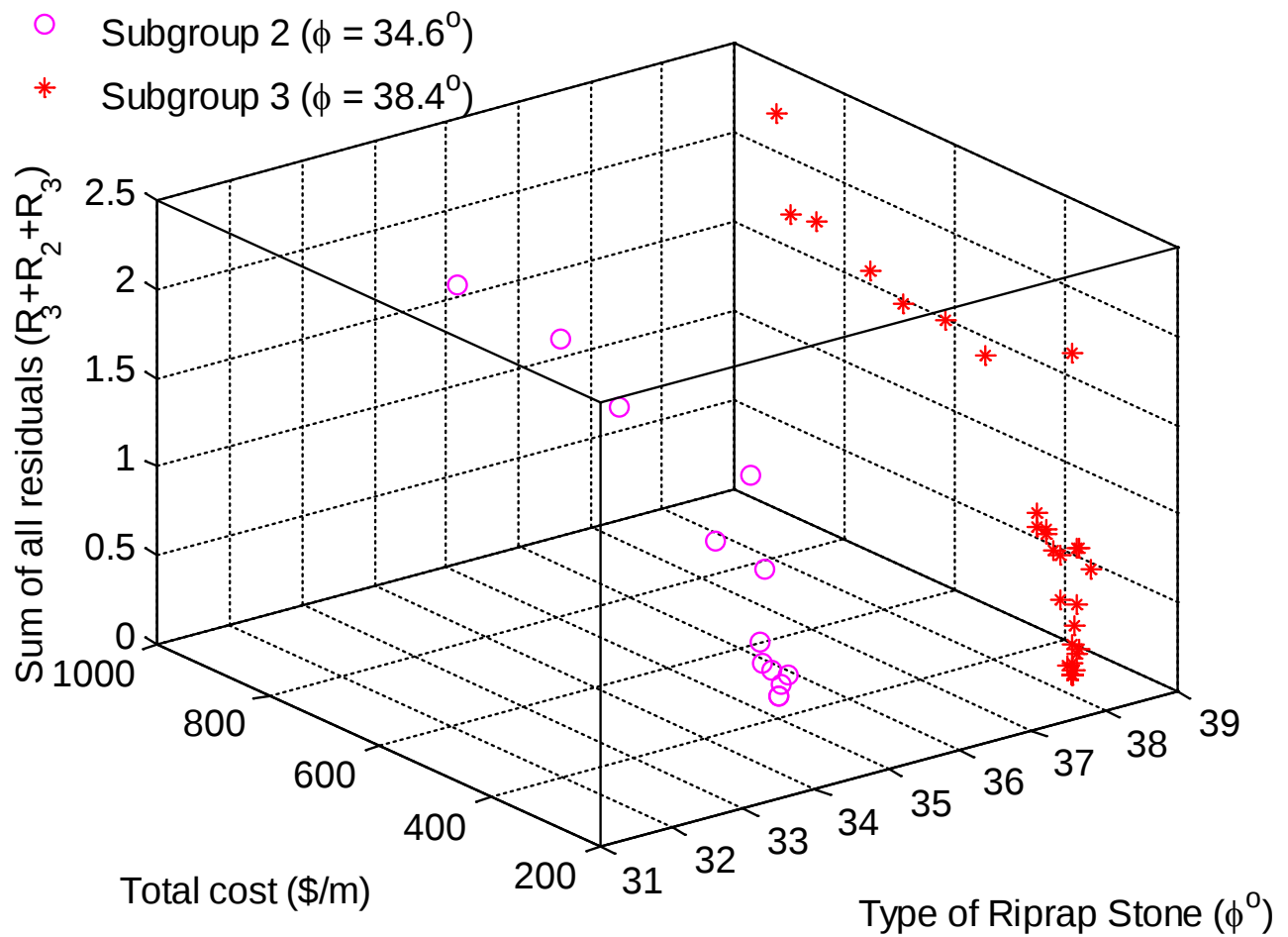


Fig. 7.10 Characteristics of the overall fish shoal after a computational run involving maximum iteration number for freeboard scenario $f = 0.25 + 0.25 y^{0.25}$ with parameter setting 1

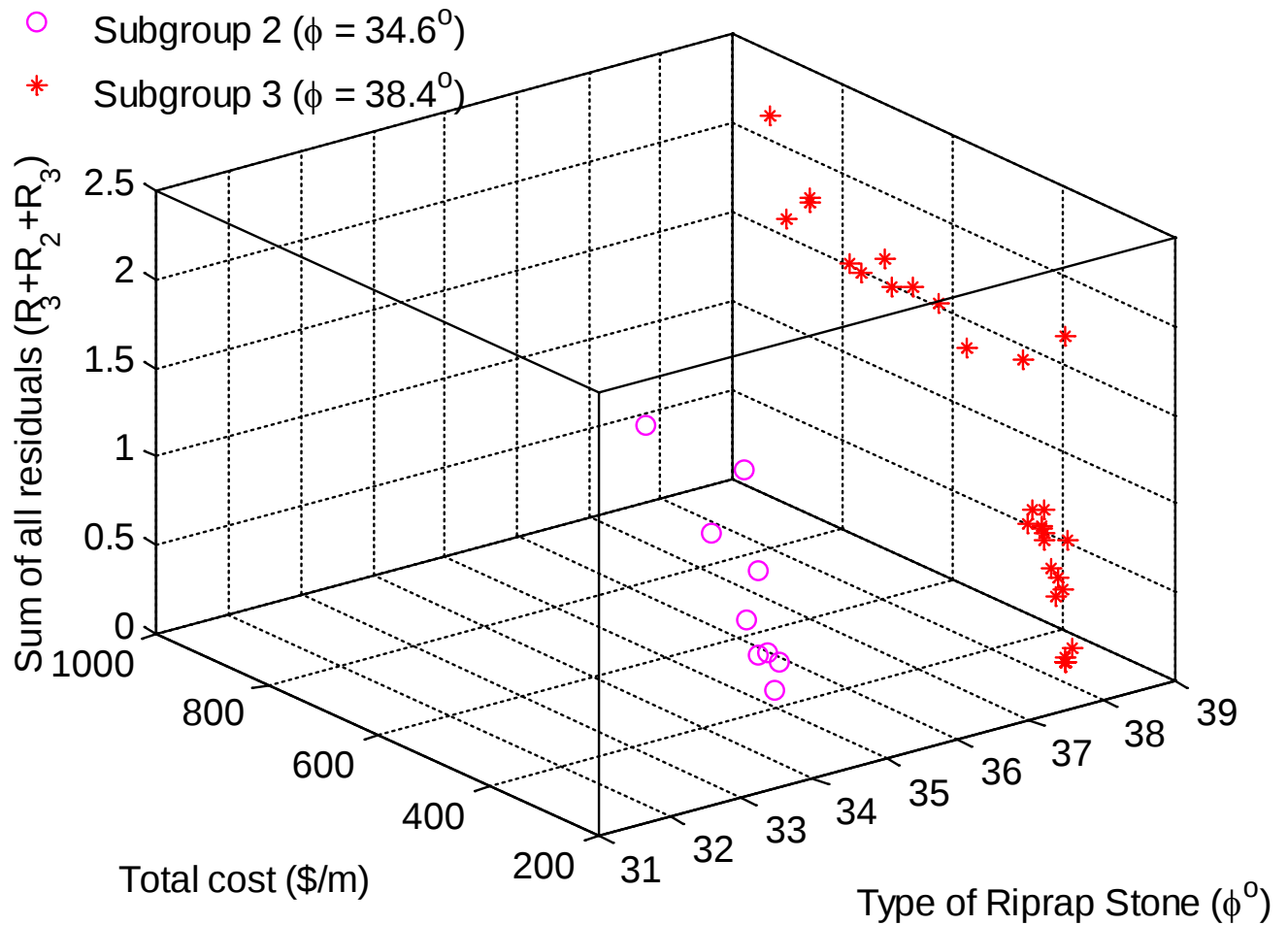


Fig. 7.11 Characteristics of the overall fish shoal after a computation run involving maximum iteration number for freeboard scenario $f = 0.25+0.25 y^{0.5}$ with parameter setting 1