A known phase-functions method (PFM) has been considered for calculation of a singlechannel nucleon–nucleon scattering. The following partial waves of a nucleon–nucleon scattering have been considered using the phase shifts by PFM: 1S0-, 3P0-, 3P1-, 1D2-, 3F3-states for nn-scattering, 1S0-, 3P0-, 3P1-, 1D2-states for pp-scattering and 1S0-, 1P1-, 3P0-, 3P1-, 1D2-, 3D2-states for np-scattering. The calculations have been carried out using phenomenological nucleon–nucleon Nijmegen group potentials (NijmI, NijmII, Nijm93 and Reid93) and Argonne v18 potential. The scalar scattering amplitude has been calculated using the obtained phase shifts. Our results are not much different from those obtained by using the known phase shifts published in other papers. The difference between calculations depending on a computational method of phase shifts makes: for real (imaginary) parts 0.14–4.36% (0.16–4.05%) for NijmI. 0.02–4.79% (0.08–3.88%) for NijmII. 0.01–5.49% (0.01–4.14%) for Reid93 and 0.01–5.11% (0.01–2.40%) for Argonne v18 potentials.