In this paper we present a method to analyse absorption line spectra of a galaxy designed to determine the stellar dynamics and the stellar populations by a direct fit to the spectra. This paper is the first one to report on the application of the method to data. The modelling results in the knowledge of distribution functions that are sums of basis functions. The practical implementation of the method is discussed and a new type of basis functions is introduced.

With this method, a dynamical model for NGC 3258 is constructed. This galaxy can be successfully modelled with a potential containing 30% dark matter within 1\(r_e\) with a mass of \(1.6 \times 10^{11} M_\odot\). The total mass within 2\(r_e\) is estimated as \(5 \times 10^{11} M_\odot\), containing 63% dark matter. The model is isotropic in the centre, is radially anisotropic between 0.2 and 2 kpc (0.88\(r_e\)) and becomes tangentially anisotropic further on. The photometry reveals the presence of a dust disk near the centre.