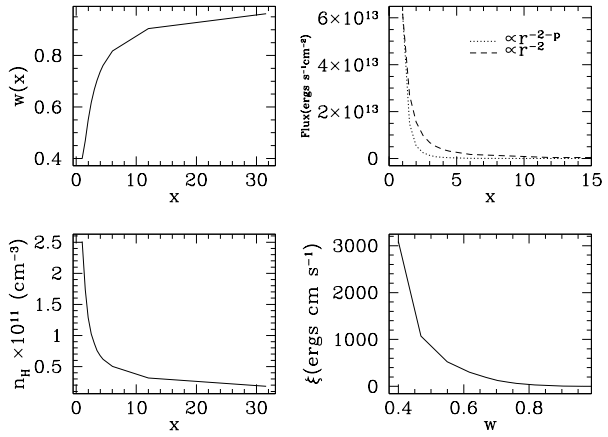

Fig. 4. Variation of the main kinematic and ionization variables for model A (see text). Upper left: Velocity law $w(x)$ for the model. Upper right: The ionizing radiative flux, decaying as $\propto r^{-2}$ (dashed line) and as $\propto r^{-2-p}$ (dotted line). Lower left: Variation of the density as function of x. Lower right: Variation of the ionization parameter (ξ) with the normalized velocity.

TABLE 1

COMPOSITION AND PARAMETER VALUES OF THE KINEMATIC MODEL A[a]

Element	Relative Abundance
H	1.0
He	0.1
C	0.3540E-03
N	0.9330E-04
O	0.7410E-03
Ne	0.1200E-03
Mg	0.3800E-04
Si	0.3550E-04
S	0.2140E-04
Ar	0.3310E-05
Ca	0.2290E-05
Fe	0.3160E-04

[a]In this model $w_0 = 0.4$, $v_\infty = 900$ km s^{-1}, $\log_{10} r_0 = 15.75$ [cm], $v_{\rm turb} = 200$ km s^{-1} and $N_H = 5\times10^{20}$ cm^{-2}.

We can see the variation with distance of the input parameters w, flux, n_H and ξ, for model A in Figure 4. In Figure 5 we plot the velocity shifts taken from the maximum line optical depths $\tau_{\rm max}$ of our model versus the line centroids measured by Kaspi et al. (2002) for NGC 3783 (see Table 3 in that paper).

We fit a linear model by robust regression using the M estimator (Huber 1964). The weights are included as the inverse of the variances, with the variance equal to $\Delta v = (v_{\rm lo} + v_{\rm hi})/2$, and $v_{\rm lo}$, and $v_{\rm hi}$ are the differences between centroid and lower and upper velocity limits of the measured lines given in Table 3 of Kaspi et al. (2002). The best-fit slope is 0.97±0.31 (solid line in the figure), and the residual standard error (rms) is 15.4 for 25 degrees of freedom (dof). The agreement is encouraging, considering that no model has been suggested before to explain the possible correlation between the ionization parameter and the velocity shift seen in this Seyfert galaxy.

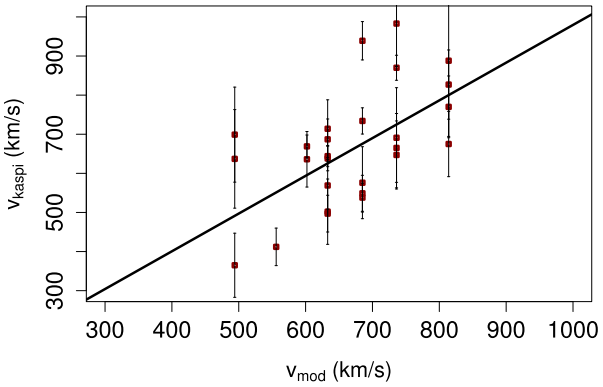

Fig. 5. Measured vs model predicted velocities for the group of unblended lines given in Table 2 of Ramírez et al. (2005). The measurements are taken from Kaspi et al. (2002). The solid line is the best line after a linear regression for model A.

Although the velocity shifts measured with respect to line minima are well explained by this model the distribution (in general) of the line profile shapes is not in agreement with that reported in Ramírez et al. (2005), for instance. From that study, most lines have extended blue wings. On the other hand, the model does predict the correct asymmetries for a few lines from highly ionized species, but the profiles of the lower ionizations lines exhibit more extended red wings, unlike the observations. The discrepancy between the modeled profile of the O VIII λ18.9 line and that observed in NGC 3783 is important. This is why we created model B.

In Figure 6 we present the variation of the variables governing the kinematics and the ionization structure of another model (model B). Here we change slightly the parameters $\log \xi_0$, and v_∞ (see Table 2 for details). The wind has the parameters $\beta = 2$, $\kappa = 1.5$ and $p = 1.5$. The number of kinematic components m is 11. The abundances and the column density are as in model A. In this model the variations in ionization parameter and density are $\log \xi = 3.00 - (-1.13)$ [erg cm s^{-1}] and