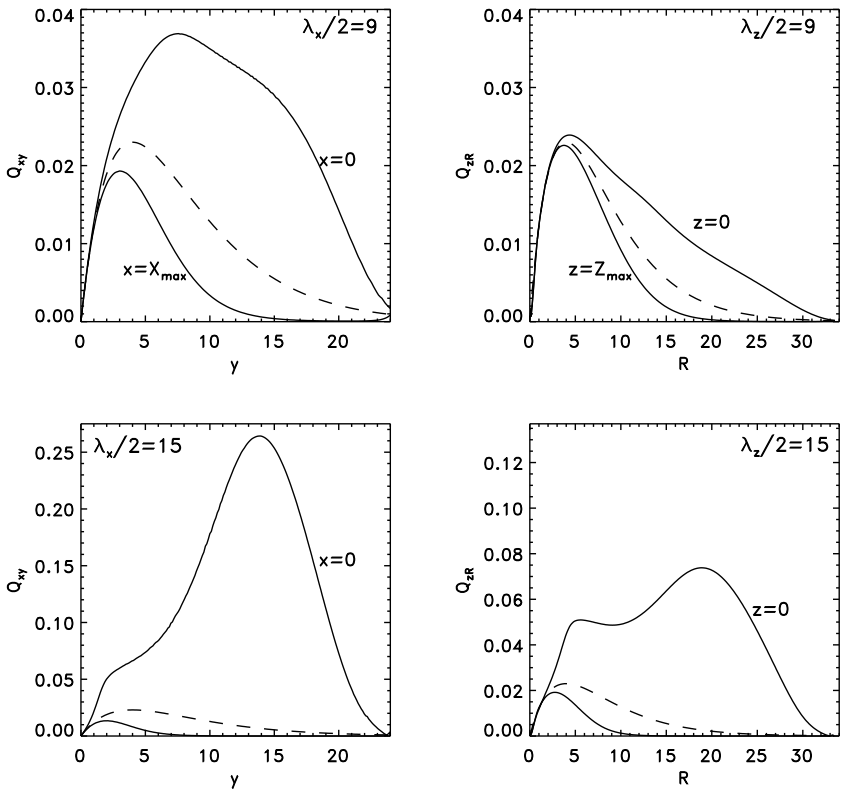

Fig. 4. The dependence of the functions Q_{xy} and Q_{zR} on y and R, respectively in the initial states (dashed lines) and in the final states (solid lines), with $\alpha = 1$ and constant gravity. In the left panels, Q_{xy} is shown along the lines $x = 0$ and $x = X_{\max}$ for two different wavelengths: $\lambda_x/2 = 9$ and 15. The right panels display Q_{zR} along the lines $z = 0$ and $z = Z_{\max}$ for $\lambda_z/2 = 9$ and 15, as quoted in the corners of these panels.

that the extra material that has been loaded into the valley when the upper boundary is placed at 33.5, does not cause significant additional compression in the radial direction.

In order to have the same dynamical range in all our calculations, we will place our upper boundary at the distance at which the variable of interest (A for the Cartesian model and Φ for the axisymmetric case) decreases to $\exp(-6.12) = 0.0022$ of its maximum value. With this convention, $Y_{\max} = 12.2(1 + \alpha)$ and $R_{\max} = 16.7(1 + \alpha)$. Interestingly, in the axisymmetric case, the corresponding density at $R_{\max}$ is only 5.4×10^{-8} of its value at $R = 0$.

Different magnetostatic equilibrium configurations can be found by choosing the function $q(A)$ for the Cartesian model and $q(\Phi)$ for the axisymmetric one. Parker (1966) explored the cases in which $q(A)$ is either a linear or quadratic function of A. In practice, these functions are not free because they are defined by the initial conditions. M74 emphasized that q increases when A decreases in the Cartesian model. In Figure 3, the functions $q(A)$ for the Cartesian layer and $q(\Phi)$ for the axially-symmetric configuration are plotted for $\alpha = 1$ and $\lambda_x/2 = \lambda_z/2 = 15$. In the initial state, the function $q_0(A)$ follows a power-law with index -2α (see § 3.1 and Figure 3). In the final equilibrium state, the power-law index varies with A, but $q(A)$ is always a monotonically decreasing function. As discussed in § 3.2 and shown in Figure 3, the slope of q in the initial state of the axisymmetric model is steeper than in the Cartesian model. In fact, q_0 reaches a maximum value of $10^{7.3}$ in the axisymmetric model, but only $10^{6.2}$ in the Cartesian model. Note that the range of the q-axis in Figure 3 spans somewhat different values in order to facilitate comparison of the shape of the curves. The behavior of q versus Φ in the final equilibrium state is similar to that of q versus A (see Figure 3), although the new geometry introduces some remarkable differences in the shape of the function $q(\Phi)$. For instance, the change of q, relative to its initial value, in the range $0.6 < \log_{10} \Phi^{-1} < 1.5$ is smaller than in the same range of A in the Cartesian model. The similar appearance of the functions