List of Figures

2.1 The exactly solvable potential \( V(r) \) with ground-state wave function \( \psi_0(r) \) and excited-state wave function \( \psi_1(r) \) given by expressions (2.22) and (2.23) shown as function of \( r \) ........................................... 29

2.2 The exactly solvable potential \( V(r) \) with ground-state wave function \( \psi_0(r) \) and excited-state wave functions \( \psi_1(r) \) and \( \psi_2(r) \) given by expressions (2.32) and (2.33) shown as function of \( r \) ........................................... 31

2.3 The Sturmian potential \( V(r) \) with single eigenstate \( \psi(r) \) given by expressions (2.56) and (2.57) shown as function of \( r \) ........................................... 38

2.4 The exactly solvable potential \( V(r) \) with ground-state wave function \( \psi_0(r) \) and excited-state wave functions \( \psi_1(r) \) and \( \psi_2(r) \) given by expressions (2.67) and (2.69) shown as function of \( r \) ........................................... 43

2.5 The exactly solvable potential \( V(r) \) with associated wave functions \( \psi(r) \) given by second row in Table 2.3 shown as function of \( r \) ........................................... 44

2.6 The exactly solvable potential \( V(r) \) with associated wave functions \( \psi(r) \) given by third row in Table 2.3 shown as function of \( r \) ........................................... 44
3.1 The radial oscillator potential and the extended radial oscillator potential plotted as function of $r$ in arbitrary units. ....................................................... 54

3.2 The Morse potential and the extended Morse potential plotted as function of $r$ in arbitrary units. .......................................................... 56

3.3 The Scarf I potential and the extended Scarf I potential plotted as function of $r$ in arbitrary units .......................................................... 60

3.4 The Rosen-Morse potential and the extended Rosen-Morse potential plotted as function of $r$ in arbitrary units ....................................................... 62

5.1 The exactly solvable potential $V(r)$ with ground-state wave function $\psi_0(r)$ and excited-state wave functions $\psi_1(r)$ and $\psi_2(r)$ given by expressions (5.32) and (5.34) shown as function of $r$. ....................................................... 99

5.2 The exactly solvable potential $V(r)$ with ground-state wave function $\psi_0(r)$ and excited-state wave functions $\psi_1(r)$ and $\psi_2(r)$ given by expressions (5.45) and (5.47) shown as function of $r$. ....................................................... 102