# Modal Vibrations of Handbells & Church Bells



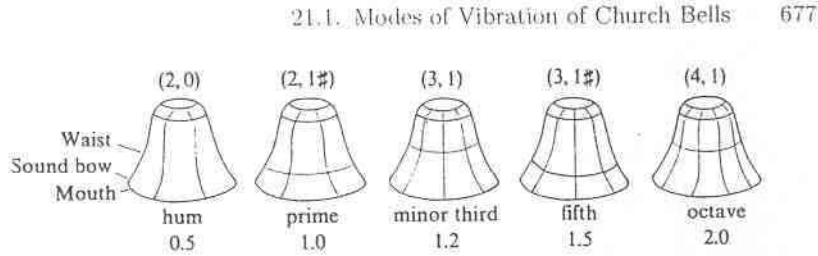21.1. Modes of Vibration of Church Bells    677

FIGURE 21.1. The first five vibrational modes of a tuned church bell or carillon bell. Dashed lines indicate the nodes. Frequencies (Hz) relative to the prime and names of the corresponding partials are given below each diagram (Rossing, 1984b).
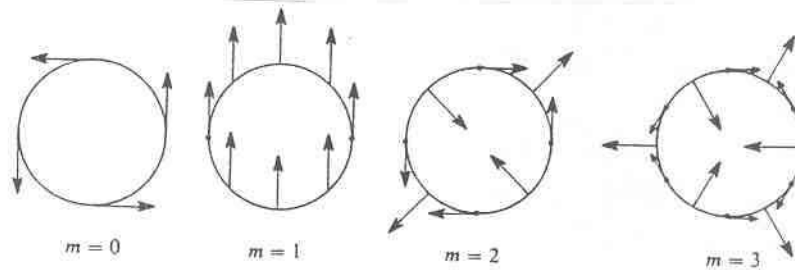


FIGURE 21.2. Motion of a bell for inextensional modes of small $m$. Modes with $m = 0$ and $m = 1$ require one or more nodal circles ($n > 0$).

The two integers ($m$, $n$) respectively denote the number of complete nodal ($m$) *azimuthal* **meridians** extending over the top of bell (*n.b.* = ½ of such nodes along a circumference) and $n$ = number of nodal **circles**. Note that since have two integers, the handbell/churchbell effectively vibrates as a 2-D object – it is simply bent/deformed into a 3-D spatial object…