1. Figure 1 caption:
   Movie showing velocities detected by our array of ultrasound probes in the $\Gamma = 1.4$ vessel at $Ra = 9.77 \times 10^5$. The jump rope vortex is the dominant flow mode and manifests as periodic patterns in the measured velocities.

2. Figure 2a caption:
   Movie showing a vertical slice of the flow over one overturn period of the jump rope vortex in the $\Gamma = 1.4$, $Ra = 1.18 \times 10^6$ simulation. The flow is conditionally averaged from many cycles of the jump rope motion. The left panel shows the speed as the background colour and the right panel shows temperature as the background colour. In the left panel, the vortex core can be tracked as a low velocity region which orbits around the vessel in a clockwise sense.

3. Figure 2b caption:
   Movie showing a vertical slice of the flow over one overturn period of the jump rope vortex in the $\Gamma = 1.4$, $Ra = 1.18 \times 10^6$ experimental case. The flow is conditionally averaged from many cycles of the jump rope motion. The periodic motion in each probe beam reflects the orbiting motion of the vortex core.

4. Figure 3 caption:
   Movie showing the resultant flow field on ultrasound probes 6 and 7 after applying a bandpass filter over the secondary frequency peak in the $\Gamma = 1.4$, $Ra = 9.77 \times 10^5$ experimental case. Between relatively quiescent periods, oscillating motions offset by 180° in phase manifest in probes 6 and 7. This may reflect a torsional motion of the LSC.

5. Figure 4 caption:
   Movie showing the resultant flow field after applying a bandpass filter over the primary frequency peak in the $\Gamma = 1.4$, $Ra = 9.77 \times 10^5$ experimental case. Non-periodic behaviours are filtered out and so the resulting movie shows the motion relative to the mean flow.