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Apparatus for Real-Time Acoustic Imaging of Rayleigh-Bènard Convection[1] KERRY KUEHN, JONATHAN POLFER, JOANNA FURNO, Wisconsin Lutheran College — Shadowgraph visualization of the Rayleigh-Bènard instability in optically transparent fluids has enabled comparison between theoretical and experimental work on a well defined nonlinear system. Rayleigh-Bènard convection in liquid metals, however, remains largely unexplored owing primarily to the difficulty of imaging flow patterns in opaque fluids. We have designed and built an apparatus for high-resolution real-time imaging of convective flow patterns in optically opaque fluids which takes advantage of recent advances in two-dimensional ultrasound transducer array technology. The experimental apparatus employs a modified version of a commercially available two-dimensional ultrasound camera, similar to those now employed in non-destructive testing of solids. Images of convection patterns are generated by observing the lateral variation of the temperature dependent speed of sound *via* refraction of acoustic plane waves passing vertically through the fluid layer. The apparatus has been utilized to observe straight rolls in transparent 5 cSt. silicone oil. Thus far, we have not observed stable convection rolls in liquid mercury.

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