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Air convection demonstration via background-oriented schlieren technique

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Convection is one of the heat transfer mechanisms in which heated fluid expands and rises while the cooled fluid shrinks down. The air convection occurs naturally but difficult to be observed when there is a slight difference between temperature of heated object and the ambience. Schlieren imaging technique is mostly used to visualize the motion of the fluid itself. This method, however requires high accuracy and expensive optic devices. Background-oriented schlieren (BOS) is an optical measurement technique where the velocity field of the viewing region could be visualized. In this study, air flow field around ice cube, hand and candle flame were constructed and the converted air speed were measured using Particle Image Velocimetry (PIV) technique from MATLAB PIVlab toolbox. The results showed that the BOS technique can be similarly used to visualize the air convection around the testing objects when comparing to schlieren technique yet significantly costs less in expenditure.

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