Particle Image Velocimetry Measurements of Velocity, Acceleration, and Shear Within Cell Growth Experimental Setup

by

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ABSTRACT

Cell growth experiments are used to determine the effects that various environmental factors have on the development and life cycles of cells. For current earth-based testing, the experiments are conducted in Erlenmeyer flasks on orbital shaker tables. This method has been used for several decades and serves as the baseline testing configuration. In the future, cell growth experiments will be conducted on the International Space Station (ISS), which will permit long duration testing of the effects of gravity on the development and life cycle of cells. Particle Image Velocimetry (PIV) has been used to measure the three-dimensional velocity field within the flasks. The high-resolution PIV data have been used to calculate accelerations and shear stresses that the cells typically encounter during testing. The PIV data will be used to verify that the fluid environment during testing on the ISS is comparable to that encountered during earth-based testing.

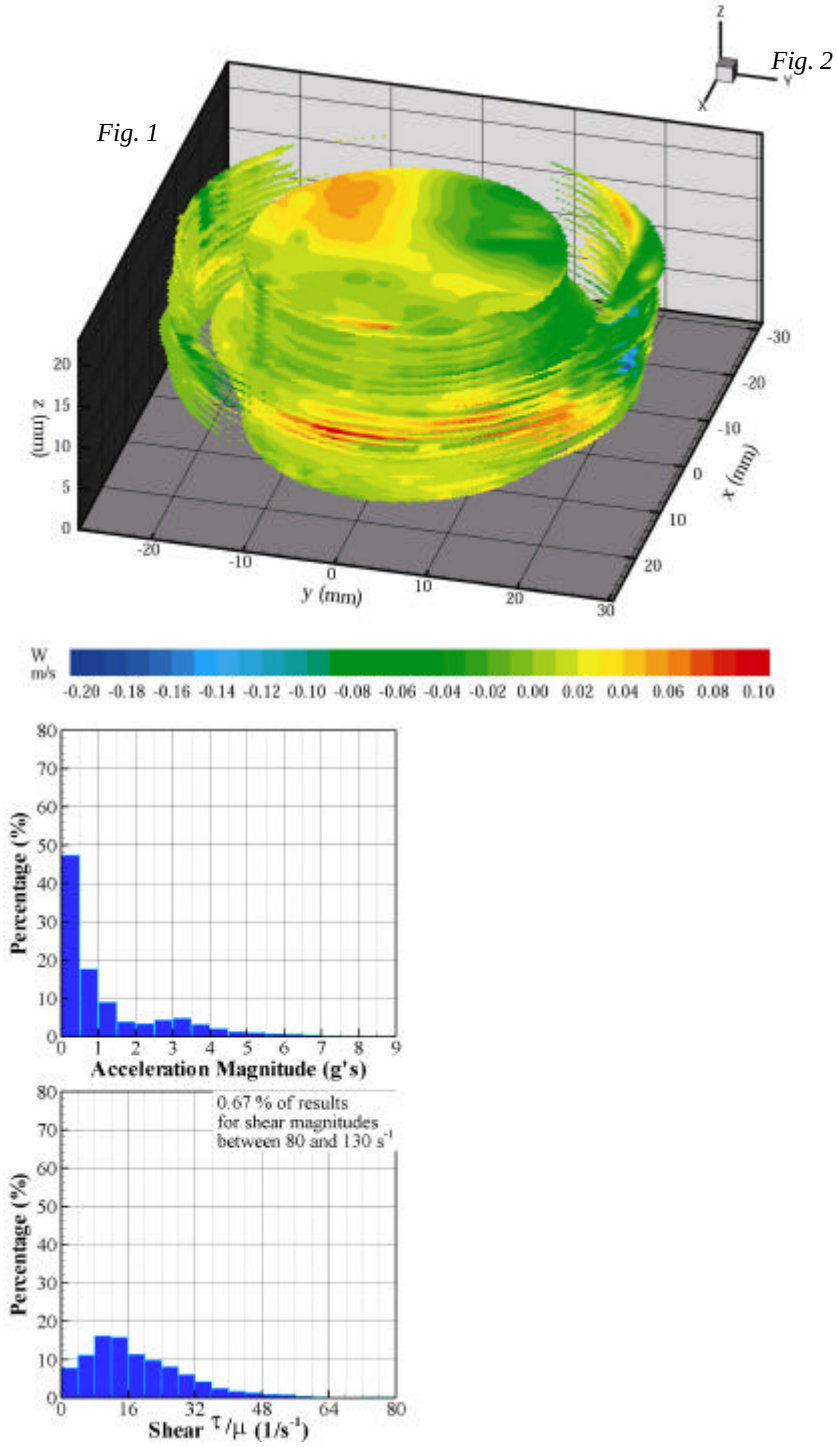

Fig. 1. 3D Illustration of Out-of-Plane Component of Velocity

Fig. 2. Quantitative results of acceleration and shear for Fig. 1 dataset