

Abstract Submitted
for the DFD13 Meeting of
The American Physical Society

Synthetic streak images (x-t diagrams) from high-speed digital video records GARY SETTLES, Penn State University — Modern digital video cameras have entirely replaced the older photographic drum and rotating-mirror cameras for recording high-speed physics phenomena. They are superior in almost every regard except, at speeds approaching one million frames/s, sensor segmentation results in severely reduced frame size, especially height. However, if the principal direction of subject motion is arranged to be along the frame length, a simple Matlab code can extract a row of pixels from each frame and stack them to produce a pseudo-streak image or x-t diagram. Such a 2-D image can convey the essence of the large volume of information contained in a high-speed video sequence, and can be the basis for the extraction of quantitative velocity data. Examples include streak shadowgrams of explosions and gunshots, streak schlieren images of supersonic cavity-flow oscillations, and direct streak images of shock-wave motion in polyurea samples struck by gas-gun projectiles, from which the shock Hugoniot curve of the polymer is measured. This approach is especially useful, since commercial streak cameras remain very expensive and rooted in 20th-century technology.

Gary Settles
Penn State University

Date submitted: 27 Jul 2013

Electronic form version 1.4