Analysis of Laser Signal Disruption for Sensitive Compartmented Information Facilities via Oscillation of Reflecting Media

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My previous project showed that irregular transparent window coatings can subvert the security implications of laser surveillance. In this work, I have addressed the same goal by using active vibration of the window to mask the acoustic signal. Various masking arrangements were tested: a noise cancellation approach and large masking signals that were sinusoidal, arbitrary speech, and white noise. The noise cancellation approach only worked at some specific points on the window; therefore, this approach was rejected. The effectiveness of masking signals was evaluated using Fast Fourier Transforms (FFTs) of the laser surveillance signals obtained in the various cases. Even though a sinusoidal masking signal would be filterable, the FFTs showed that such filtering would at least distort the speech signal if the masking frequency was within the speech frequency range. A masking speech signal introduced broadband disruptions that more effectively masked the acoustic signal, and might also be used to introduce false information. Tests with white noise masking are ongoing. Potential for applied vibration to disrupt window image clarity was evaluated by photographic analysis through the vibrating window. Vibrationally-induced audible disruptions were tested by measuring decibel levels at a separation from the window. The data showed these effects to be negligible. Even with a masking signal 7x larger than the original signal, the acoustic interference in the room was 10x lower than ordinary conversation. Overall, while the noise cancellation approach was ineffective, results suggest that masking approaches could disrupt laser eavesdropping while allowing for minimal auditory and optical disruption.