

UNIVERSITY OF MIAMI
DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING

EEN 502/MMI361 Engineering Acoustics

Project No.1

EXPERIMENTING WITH DOPPLER SOUND EFFECTS

Framework

There is a stationary observer and a moving sound source (or a stationary source and a moving observer) in an acoustic field or air free of any other objects, and diffraction or reflection phenomena. It is required that you create an experimental setup in software which will allow you to specify the initial and final position of the source, its trajectory of motion, its speed, and the properties of the signal emitted at the source. Given all that, you should be able to produce the sound received by the observer. The observer is assumed to be a simple microphone.

1. Let a sound source produce a single tone at frequency F_0 . The source is moving on a straight line that passes “through” the observer. Plot the velocity of the source relative to the observer, the signal envelope, and the apparent frequency of the source as functions of time. Generate the sound at the position of the observer.
2. Set up the experiment so that you can specify the minimum distance of the observer from the source trajectory, and repeat (1). Produce a set of results as in part (1) for the listener at some distance away from the source trajectory.
3. Repeat (2) with the source consisting of a composition of a 3-tone signal.
4. Assume the receiver is a human listening binaurally. The interaural distance in an adult subject is 17 cm. Repeat the preceding parts for this scenario by ignoring any head shadow effects. Generate the stereo signals appropriate for setups (1) and (2).

You are required to present your report in a **web page** by the due date. Include all figures and all audio samples used or generated. Summarize your results and conclusions. It is recommended that you use Matlab for simulations.