



## On the role of mean flows in Doppler shifted frequencies

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In the oceanographic literature, the term 'Doppler shift' often features in the context of mean flows and (internal) waves. Closer inspection reveals that the term is in fact used for two different things, which should be carefully distinguished, for their conflation results in incorrect interpretations. One refers to the difference in frequencies measured by two observers, one at a fixed position and one moving with the mean flow. The other definition is the one used in physics, where the frequency measured by an observer is compared to that of the source. In the latter sense, Doppler shifts occur only if the source and observer move with respect to each other; a steady mean flow cannot create a Doppler shift. We rehash the classical theory to straighten out some misconceptions and discuss how wave dispersion affects the classical relations and their application, for example on near-inertial internal waves.