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Gravitomagnetic Love numbers and neutron star stability MARC FAVATA, Cornell University — It is well known that a fluid star placed in a Newtonian tidal field will develop a mass quadrupole moment. The size of this induced mass quadrupole depends on the strength of the tidal field and the star's 'Love number', a constant which depends on the equation of state. Similarly, a gravitomagnetic tidal field will induce a current quadrupole moment whose magnitude is proportional to the gravitomagnetic tidal field and the star's 'gravitomagnetic Love number'. I will discuss the computation of this induced current quadrupole for rotating and non-rotating stars interacting with static and rotating tidal fields, as well as its application to neutron star binaries. In particular, the nonlinear interaction between the current quadrupole and gravitomagnetic field tends to increase the star's central density (although in most situations this effect is smaller than the well known stabilizing effect of a Newtonian tidal field). The induced current quadrupole vanishes for binaries that are corotating or irrotational, assumptions that are made in most numerical simulations of binary neutron stars.

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