The fluctuation-response relation is a pillar of non-equilibrium statistical physics,and has been widely used in microrheology applications to determine the characteristics of simple as well as complex, viscoelastic fluids. In our present paper, we provide a direct experimental verification of the fluctuation-dissipation relation in a system of two hydrodynamically coupled colloidal particles trapped in separate optical tweezers in a viscous medium (water). In addition, we identify a resonance in the response function, which is a surprise given the overdamped nature of the dynamics. The resonance is tunable and can be used for accurate two point microrheology.