

# TRANSVERSE DYNAMICS IN FLUIDS: HOW A COLLECTIVE EXCITATION SETS IN

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The transverse-current autocorrelation function  $C_T(Q, t)$ , obtained by molecular dynamics simulation of a dense Lennard-Jones fluid, has been analyzed in the wavevector range between the hydrodynamic region and  $Q_p/2$  (where  $Q_p$  is the position of the main peak in the static structure factor). The exponential expansion theory (EET) provides a full and accurate account of  $C_T(Q, t)$ , and reveals a varied dynamical behaviour. We identify and accurately locate the  $Q$  value at which a shear wave begins to propagate, and show how this phenomenon is described as the continuous transition of a harmonic oscillator from the overdamped to the underdamped state. Moreover, this analysis reveals the existence of a second pair of modes equivalent to another oscillator that undergoes, at higher  $Q$  values, a similarly smooth over- to underdamped transition [1].

[1] E. Guarini *et al.*, Phys. Rev. E (2023), in press.