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Theory of momentum transport in rotating/stratified HD and MHD turbulence[1] EUN-JIN KIM, N LEPROVOST, Univ. of Sheffield — The importance of magnetic fields, rotation, and stratification in momentum transport cannot be overemphasized. They excite waves in the system, which modify the property of turbulence, with a crucial effect on transport. Indeed, one of the main difficulties in stellar rotational evolution theory has been the lack of a consistent theory of momentum transport incorporating complex physical interactions between turbulence, waves, and shear flow. In particular, while shear flow is often considered to be a source of turbulence, the effect of stable shear flow on regulating turbulence has been totally ignored in traditional modelling. Here, we first show that shear flows can quench turbulence, leading to weak, anisotropic turbulence and momentum transport [1]. Strong anisotropy caused by shear flow leads to non-diffusive momentum transport (like alpha effect in dynamos) in rotating turbulence [2]. Furthermore, in strongly stratified medium, momentum transport becomes anti-diffusive, with negative eddy viscosity, offering a mechanism for the formation of layer-like structure. The effect of magnetic field on transport reduction by the cancellation of Reynolds stress by Maxwell stress is demonstrated [3]. [1] N. Leprovost and E. Kim, A&A, 456, 617 (2006) [2] N. Leprovost and E. Kim, A&A, L654, 1166 (2007) [3] E. Kim and N. Leprovost, A&A, 468, 1025 (2007); 465, 633 (2007)

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