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Ice melting in stratified shear turbulence PEJMAN HADI SICHANI, Vienna University of Technology University of Udine, FRANCESCO ZONTA, Vienna University of Technology, CRISTIAN MARCHIOLI, University of Udine, ALFREDO SOLDATI, Vienna University of Technology University of Udine — Ice shelves are floating tongues of ice that extend from grounded glaciers on land, and are important for ocean stratification and bottom water formation. We perform direct numerical simulations (DNS) of the flow below a melting ice shelf. The flow is driven by a far-field current (via an imposed pressure gradient) and by the competing action of two scalar fields: temperature, which is an unstably-stratified, rapidly-diffusing scalar, and salinity, which is a stably-stratified, slowly-diffusing scalar. The ice melting rate depends on the local ice-seawater interface gradients of temperature and salinity. The entire problem is controlled by six dimensionless parameters, namely: shear Reynolds number Re_τ, Grashof number Gr, density stability ratio Λ, Prandtl number Pr, Schmidt number Sc and Stefan number St. The value of these dimensionless parameters are chosen so to mimick the case of a melting oceanic ice shelf. Our preliminary results show that the ice melting mechanism influences the underneath flow stratification, thereby modulating the turbulence structure. At the same time – feedback effect – such turbulence modification influences the ice shelf melting rate.

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