A summertime near-ground velocity profile of the Bora wind

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ABSTRACT

While effects of the atmospheric boundary layer flow on engineering infrastructure are more or less known, some local transient winds create considerable difficulties to traffic and structures. An example is the gusty Bora wind blowing along the eastern Adriatic coast, and many other places around the world. As previous meteorological and geophysical studies laid grounds on the Bora's large- and meso-scale motions (e.g. Grisogono and Belušić 2009), further work is required to fully determine Bora micro-scale characteristics in a form usable for engineers. In this study, the Bora vertical velocity profile is examined at the meteorological tower close to the city of Split, Croatia, by using 3-level high-frequency measurements. The experimental results agree well with the power-law (Hellman, 1916) and the logarithmic-law (Stull, 1988). An interesting feature is a decrease in the power-law exponent, friction velocity and aerodynamic surface roughness length with increasing Bora wind velocity. This indicates an urban-like velocity profile for smaller wind velocities and rural-like velocity profile for larger wind velocities. Similar trends are observed both during the day and night. Time averaging period does not show significant effects on the form of velocity profiles. Bora turbulence is predominantly generated mechanically due to an intense mixing, while the thermal effects are negligible, as the stratification of the atmospheric surface layer is near-neutral.

REFERENCES

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