Aerodynamic characteristics and wind direction above a spruce forest stand

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A b s t r a c t : In this paper an analysis of the wind direction and wind speed profile measurements in and above young spruce forest stand is presented. The needed experimental data were obtained by measurements during the growing season of the year 2004 (May to October) in the locality Bílý Kříž (49°30′17″ N, 18°32′28″ E, 898–908 m a.s.l.) in Moravian-Silesian Beskydy Mts, Czech Republic. The experimental site consisting of two plots Fd and Fs with different tree density is created by the monoculture of a Norway spruce stand. The wind direction was measured continuously by the InSituFlux system (Sweden). It was found out that the prevailing wind above the investigated spruce forest stand came from the SSW direction, in more than 50% of all analysed wind directions. The reason is in the local orographic broken terrain. The analysed wind speed profiles were measured in Fs plot continuously at levels 7, 9, 10, 12, 16, and 21 m in May and June and from July at higher levels 7, 9, 10, 13, 18, and 26 m. The spruce stand in Fs plot with density 1880 trees per ha had the mean tree height (h) in the period from May to June 9.9 m and from July to October $h = 10.4$ m. For the analysis 837 profiles were selected, which fulfilled the condition: $u(9\text{ m}) > 1.0\text{ m s}^{-1}$. In that case we can assume, that the wind speed profiles were analysed in the conditions of the turbulent development.

Key words: spruce forest stand, wind speed profiles, wind direction, zero-plane displacement, roughness length

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