

# An Updated Proposal for Design Wind Speeds in Brazil

Prof. André T. Beck

Department of Structural Eng., University of São Paulo, São Carlos, SP, Brazil

email: atbeck@sc.usp.br, mcorrea@sc.usp.br

## ABSTRACT

The design charts for basic wind speeds currently in use in Brazil [1] were created in 1977, based on wind speed records from 1950 to 1974. The database covered up to 25 years of wind records obtained in 49 weather stations, totaling 919 station×years of data. Since 1974, additional 37 years of wind records became available, but have not been incorporated in the design code. Hence, the updated wind charts proposed in this paper are long overdue. In this paper, 62 years of wind records in Brazil are gathered in order to construct updated and more reliable wind charts. The original data by Padaratz [2] are complemented by data from 104 airport weather stations, made available through the Wolfram Research Database [3]. In total, 4142 station×years of data are used in the present study, hence providing much better cover in terms of space and time span. Maximum annual wind speeds for the individual stations are fitted to Gumbel distributions, from which basic wind speeds are evaluated (mean return period of 50 years). Basic wind speeds are used to build a non-linear regression model, using the p-value of the Anderson-Darling goodness-of-fit test as regression weight. This ensures that extreme value wind distributions for which a good fit is obtained are given more importance in the regression model, reducing the influence of spurious data. The regression model developed herein is used to plot a new design chart for basic wind speeds in Brazil. It is proposed that this new wind chart be incorporated in the Brazilian code for design of structures subject to wind [1]. In this regard, it is observed that basic wind speeds obtained herein are higher than the wind speeds of the current chart for significant parts of Brazil (notably the center, northeast and north), and are the same or smaller in some parts of the south and southeast. It is shown herein that the main differences between the current and the proposed charts are not due to different modeling assumptions, but are mainly due to the new data. The proposed chart is updated, and is more reliable than the chart currently in use, as it reflects 4142 station×years of data, and covers up to 62 years of wind records.