Use of the Discrete Vortex Method to Calculate Wind Loads over a Surface-Mounted Prism and a Bridge Cross-Section with Flaps

Nathan Louis Maines

(ABSTRACT)

This thesis aims at presenting the Discrete Vortex Method (DVM) as a tool to determine the flow field and associated wind loads over structures. Two structures are considered: the first is a surface-mounted prism and is used to simulate wind loads over low-rise structures. The second is a bridge section with attached flaps that can be oriented to vary the moment coefficient. Advantages and disadvantages of using DVM for these applications are discussed. For the surface-mounted prism, the results show that the developed code correctly predicts the flow separation around the corners. As for the surface pressures, it is concluded that parallel processing, which could be easily implemented for DVM, should be used to correctly predict surface pressures and their variations. This is due to the required slow time advancement of the computations. The results on attaching flaps to bridge sections yield required orientations to minimize moments under different angles of attack.

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Acknowledgements

The amount of people who have contributed to this project is innumerable; without the help and support of so many, it would not have been completed.

Dr. Hajj: you guided my academic growth and I have you to thank for much of who I am as an engineer. Throughout the last three years, you knew how to challenge me to strive for excellence while maintaining a level of patience that was often not deserved.

Dr. Mook: I came to you for help with only a short timeframe. Your guidance with the computer code was invaluable; this thesis would be one chapter shorter without your input.

Dr. Hendricks: For serving on my committee, thank you. However, most of all, thank you for letting me teach our Statics class for that one day in the fall. Knowingly, or unknowingly, that opportunity you gave me opened my eyes to my own desire to teach.

Jason Snook: my mentor, my friend. You pursued through my resistance; when I pushed, you pushed harder. You always see in me what I can not see for myself; for that I am eternally grateful. As I crossed my Jordan, you walked with me. This Thesis is without doubt one of the biggest stones we gathered.

Mom and Dad: I am who I will become; however, I know that to you, who I am has always been more than enough. You sacrifice, you listen, you hope, you laugh: you change lives. I can only hope that I will become who you are.

Ashley: no matter the day, or the hour, I have you. For most, that would be enough, but we are not most. Under any other context, a thank you might seem trite, but I truly have you to thank for this Thesis.