Numerical Simulation of Snow Deposition around Living Snow Fences

(CESTiCC Project No.: 1626)

Project Period: 9/1/2016 – 1/14/2018

Annual Update Meeting

By:
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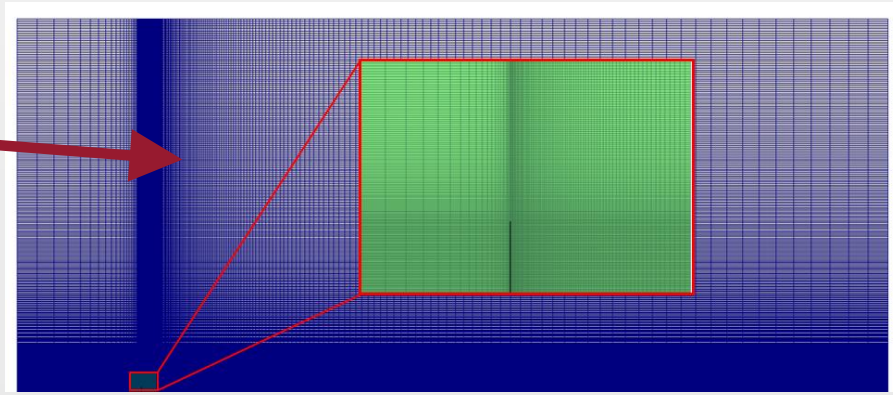
Project Overview

- Blowing snow creates hazardous driving conditions.
- Living snow fences (LSF's) can be a sustainable, economic solution for reducing blowing snow.
- Rigorous, science-based design standards for LSF's are not available

(Tabler, 2003)

Project Overview

- The specific aims of this project are to:
  1. Determine appropriate techniques to represent the porosity of living snow fences within CFD models.
  2. Demonstrate the application of CFD to blown snow and snow fences to the cold climates community.



Project Timeline

	Month																
	2016				2017												2018
Task Name	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**
1. LSF porosity	X	X	X														
2. Porosity in CFD models		X	X	X	X	X											
3. Simulation of non-porous fences					X	X	X	X	X	X							
4. Simulation of porous fences									X	X	X	X	X	X	X		
5. Website development													X	X	X	X	
Deliverables/Milestones																	
1. Quarterly report		X			X			X			X			X			X
2. Website																X	
3. Journal manuscript																X	
4. Final report																	X

Task 1. Characterize the porosity of living snow fences

- This task has proved to be challenging. Limited data is available and reporting of data is not standardized.
- We will continue work in this area throughout the project duration.

Task 2. Numerical representation of porosity

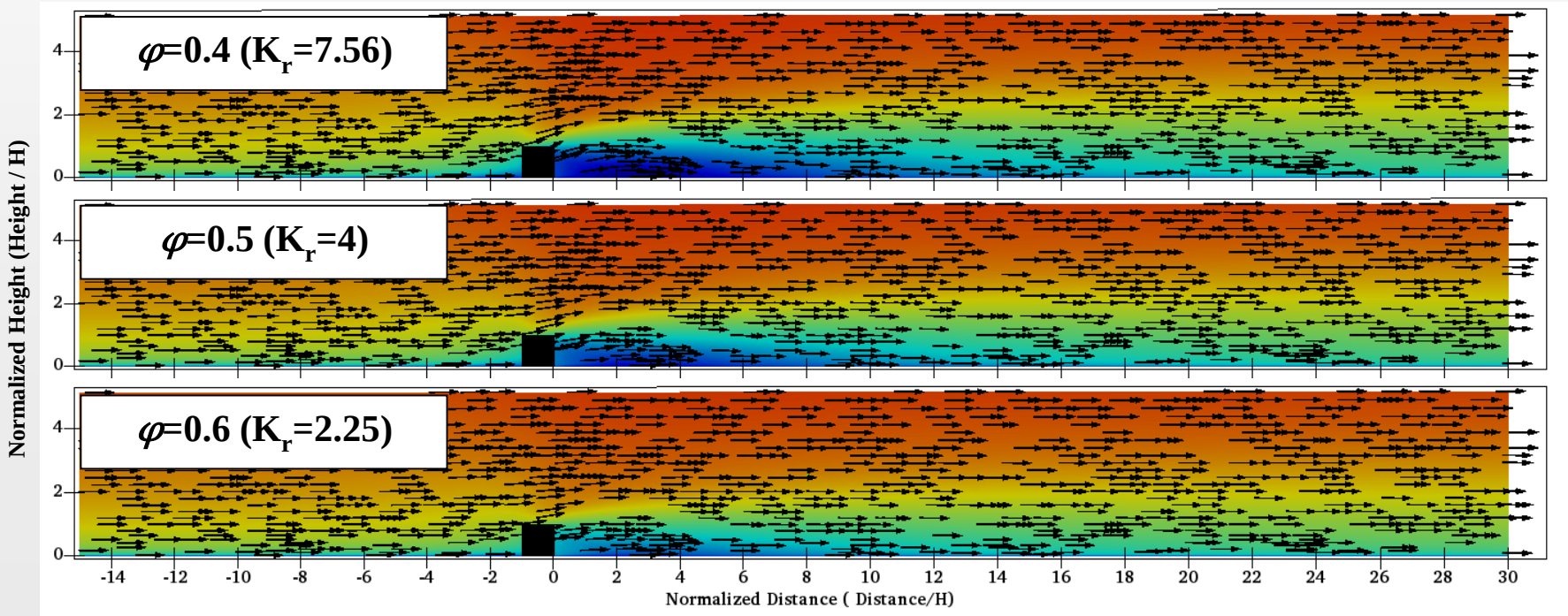
- This task has been completed.

Task 3. Simulations of non-porous snow fences

- This task is about 90% complete.

Task 4. Simulations of porous living snow fence

- This task is about 45% complete (preliminary simulations are complete).
- Results below show the effect of porosity on the velocity reduction zone behind the fence.



Task 5. Disseminate results to researchers and practitioners

- Work on the website will begin towards the end of 2017.
- Some results have been shared through journal publications and presentations.

Products and Outcomes to Date

- Journal Publication:

  Du, S., Petrie, J., Shi, X. Use of Snow Fences to Reduce the Impacts of Snowdrifts on Highways: Renewed Perspective. *Transportation Research Record*, 2017.

- Presentation:

  Shehata, M., Petrie, J. Numerical Simulations of Aerodynamics and Snow Drift around Living Snow Fences. Poster presented at the GPSA Research Exposition at Washington State University, March 31, 2017.

- Students Graduated:

  Mahmoud Shehata defended MS project yesterday!

Are there any issues I need to be aware of as I move to my new position?