STUDY ON THE SNOW DRIFTING MODELLING CRITERIA IN BOUNDARY LAYER WIND TUNNELS

Georgeta BĂETU[1], Elena Carmen TELEMAN[2], Elena AXINTE[3], Victoria Elena ROŞCA[4], Andrei AXINTE[5]

[1] Ph.D. Eng. Assistant Professor, "Gheorghe Asachi" Technical University of Iasi, Faculty of Civil Engineering and Building Services, Department of Civil and Industrial Engineering, e-mail: geta_vasies@yahoo.com

[2]Ph.D. Eng. Senior Lecturer, "Gheorghe Asachi" Technical University of Iasi, Faculty of Civil Engineering and Building Services, Department of Civil and Industrial Engineering, e-mail: carmen_teleman@yahoo.com

[3] Ph.D. Eng. Professor, "Gheorghe Asachi" Technical University of Iasi, Faculty of Civil Engineering and Building Services, Department of Civil and Industrial Engineering, e-mail: e_axinte@yahoo.fr

[4]Ph.D. Eng. Senior Lecturer, "Gheorghe Asachi" Technical University of Iasi, Faculty of Civil Engineering and Building Services, Department of Civil and Industrial Engineering, e-mail: roscave@yahoo.com

[5]Ph.D. Student, "Gheorghe Asachi" Technical University of Iasi, Faculty of Civil Engineering and Building Services, Department of Civil and Industrial Engineering

ABSTRACT

The paper presents a study on modelling the wind drifting of the snow deposited on the flat roofs of buildings in wind tunnel. The physical model of snow drifting in wind tunnel simulating the urban exposure to wind action is not frequently reported in literature, but is justified by the serious damages under accidental important snow falls combined with strong wind actions on the roofs of various buildings.

A uniform layer of snow deposited on the flat roof was exposed to wind action in order to obtain the drifting. The parameters involved in the modelling at reduced scale, with particles of glass beads, of the phenomenon of transportation of the snow from the roof were analysed, particularly the roughness length and the friction wind speed.

A numerical simulation in ANSYS CFX program was developed in parallel, by which a more accurate visualization of the particularities of the wind flow over the roof was possible, in the specific areas where the phenomenon of snow transportation was more susceptible to occur.

Modified roughness length and friction wind speed were determined through methods used in the literature, an attempt being made in this work to analyse the factors that influence their values.

Keywords: snowdrift, atmospheric boundary layer wind tunnel, reduced scale modelling, roughness length, friction speed

REZUMAT

Lucrarea se referă la modelarea în tunel aerodinamic cu strat limită a fenomenului de antrenare a zăpezii datorită acțiunii vântului la suprafața unui strat uniform aşezat pe acoperişul terasă al unei clădiri regulate, situate în mediul urban. Modelul fizic al viscolirii în tunel aerodinamic cu strat limită nu este frecvent studiat în literatură, însă este justificat de prăbuşiri ale acoperişurilor clădirilor sub depuneri importante şi neuniforme provocate de acțiunea vântului.

Parametrii implicați în modelarea viscolirii zăpezii la scară redusă cu ajutorul unui material pulverulent din bile de sticlă de diametru de 200…400 μm analizați în particular în lucrare, sunt lungimea de rugozitate şi viteza de frecare.

O simulare numerică în ANSYS CFX s-a dezvoltat în paralel, cu intenția de a vizualiza particularitățile curgerii deasupra acoperişului şi de a identifica zonele sensibile la spulberarea zăpezii.

Lungimea de rugozitate modificată datorită stratului de zăpadă depus, precum şi viteza de frecare, s-au determinat în tunel conform metodelor adoptate în literatură, tentativa fiind de a identifica factorii ce influențează valorile acestora.

Cuvinte cheie: troienire, tunel aerodinamic cu strat limită turbulent, modelare la scară redusă, lungime de rugozitate, viteza de frecare

1. INTRODUCTION

The worldwide climate is nowadays manifesting quite often violently for the anthropic space, unusual strong storms with heavy snow falls being rather frequent. The resulting important deposits of drifted snow cover the modern built environment as well as the terrestrial communications.

Increasing the safety design limits of structures not only should be a responsible act but should also have in view the optimization of any design solution. Although the codes of practice give reliable and consistent recommendations, they do not cover all particular situations for the combined effects of unusual wind and snow actions upon the construction as a whole. In cases like these, experimental studies are the only able to offer a clear view of their impact on the future structure.

The studies developed in the last 70 years show the difficulty of modelling at reduced scales, in laboratory, the snow transportation and deposits, because neither the temperature of the air, nor the material that simulates the snow may be accurately reproduced. Boundary layer wind tunnels in which negative temperatures can be reproduced and which are able to work with the ideal material for simulation, which remains the snow itself, are rare and the financial costs involved in research are very high.

Structural engineers are interested in the amount of snow loading, and that is why the simulation of the snow falls on buildings and the interaction with wind focuses on snow transportation. A high percentage of roof failures resulting from snow loads are caused by heavy drift loads rather than by uniformly distributed snow, a reason for having a second and sometimes, a better look to the accuracy of the design model chosen for analyzing the interference between the climatic manifestations and the building, in order to observe if it conforms with reality. In this respect, it is of utmost importance that the various and sometimes conflicting parameters involved in reproducing the phenomenon of snow particles entrained by wind action are harmonized.

Generally, the studies on snow deposits refer to the communication field and quite often they have in view the isolated or rural environment, where drifts around buildings may rise to impressive heights or dimensions. Fewer studies are directed to snow deposits on unusual roofs or other particular situations, although these situations are exactly the critical cases in our modern cities.

The research presented in the following refers to the study of the wind entrainment of particles that simulate the snow on a flat roof of a regular building, for the determination in wind tunnel of two basic parameters: the roughness length and the friction speed. The aim is a better understanding of the snow drifting and accumulation through laboratory tests. As long as reliable results are obtained, the design will improve the security of the building during its service life.

2. CRITERIA OF MODELLING AT REDUCED SCALE THE TRANSPORTATION OF SNOW BY WIND ACTION

2.1. Behavior of the snow particles under wind action

Snow particles are transported: by translation on the surface parallel to the flow, within very small heights, not exceeding millimeters, by saltation at heights of several centimeters and by turbulent movement and suspension in a chaotic layer of up to 100 m above the surface (Figure 1).

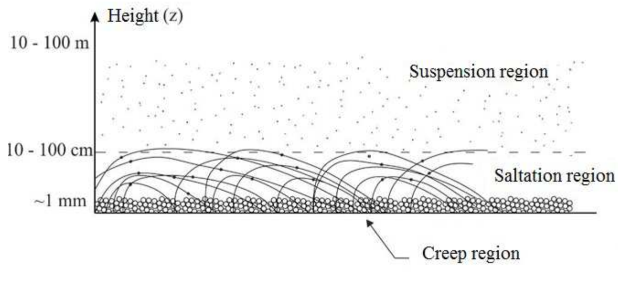


Fig. 1. Illustration of the transport regions above a horizontal snow surface (after Sundsbø, 1998).

Associated with dropping temperatures and the increasing of the wind speed, together with suspension, saltation leads to drifting and, consequently, to the formation of important snow agglomeration.

The wind speeds that entrain the snow from surfaces are, in nature, of about 0.3...1 m/s at 20 cm height above the surface; during snow storms with or without snowing, the wind speeds regularly vary from 6 to 10 m/s, although sometimes they exceed 17 m/s (Florescu, 2001).

Maximum wind speeds during snow storms in Romania may vary between 24 m/s and 29 m/s, but regularly the mean speed during a snow storm is between 11 m/s and 17 m/s; from 6 m/s up, snow agglomeration on surfaces becomes significant (Florescu, 2001). The time interval of agglomeration of snow drifts is between 2 and 4 hours and occasionally this is sufficient to develop snow deposits that may reach 1 m height and, locally, even more.

Reducing at proper scale the event duration of snow transportation for laboratory tests has in view that the process associated with drifting consists of episodes of rather strong wind that may last from several hours up to a whole day, case in which the intensity decreases in time.

The process of snow agglomeration under wind action on buildings roofs is analyzed in particular because it may generate uneven distributions of snow loading, this being the cause of degradation of the roofing or even of the failure of the elements that are part of the roof structure; such unfortunate events have occurred in the modern history of constructions (Florescu, 2001).

2.2. Approaches in modelling snow transportation in laboratory

In the absence of new snow falls during a short period of time, the drifting process of the existing, quite uniformly distributed snow deposit on a roof, during a longer period of time, will result in the transportation of an important amount of snow from the roof depending on different factors, like the shape and surface of the roof, the wind speed, the depth of the snow layer. This being the case, the time interval for study in the laboratory must be related to the observations regarding the entrainment of the particles, followed by the formation of deposits on the roof, in the worst situations.

Due to the major influence of wind action upon snow transportation, boundary layer wind tunnels are the most appropriate for physical simulation and study of this phenomenon, because they reproduce with accuracy the specific characteristics of the wind flow over the obstacles at terrain level.

The similarity between the scaled model and the prototype is achieved in the first place by respecting a geometric scale. A major difficulty of the simulation of snow drifting is the fact that a greater modelling scale gives much more comprehensive details on the volume of the snow deposit at saturation, while modelling the wind field around the buildings is generally developed at smaller scales, taking into account the necessity of immersing them properly in the boundary layer. In the study, a scale of about 1:400 was set, related to prior experience obtained via tests developed in the same wind tunnel (Teleman, 2014).

Consequently, the time scaling results from the general relationship of similarity between the process in nature and the one in laboratory:

$$\frac{V_{model}}{V_{nature}} = \frac{L_{model}}{L_{nature}} \cdot \frac{T_{model}}{T_{nature}} \tag{1}$$

where: V_{model}/V_{nature} is the speed scale, which results from the ratio between the mean speed profile obtained in the tunnel and the value at natural scale, L_{model}/L_{nature} is the length scale (geometry scale) and T_{model}/T_{nature} is the time scale.

The condition of totally immersing the model of the building in the boundary layer is respected if (Da Matta Sant'Anna, 1983):

$$\frac{u_*^3}{2g\upsilon} \geq 30 \tag{2}$$

where: u_* is the wind velocity corresponding to the in wind shear stress (m/s), g is the gravity constant (m/s^2) and υ is the kinetic viscosity of the fluid (m^2/s).

Snow particles are entrained in motion due to the wind drag force that overcomes the gravitational force and the cohesion between these particles. The accuracy of the simulation of snow particles transportation to a reduced scale, in laboratory, relies on respecting the following conditions.

– For limited wind speeds below those that determine strong storms, the mobility and suspension are controlled by the following relationship (lower limit controls the mobility, while upper limit controls the suspension) (Da Matta Sant'Anna, 1983; Da Matta Sant'Anna *el al.* 1990):

$$0...0.001 \le \frac{\rho_{air} \cdot u_*^2}{\rho_p \cdot g \cdot D_p} \le 0...1.0 \tag{3}$$

where ρ_p is the density of the particle (kg/cm^3), ρ_{air} is the density of the air (kg/cm^3), and D_p is the diameter of the particle (mm);

– The wind model must insure proper scales of the friction speed, u_*, threshold speed, $u_{*,t}$, and final speed, u_f, that define the combined regime of snow particles, saltation and suspension. In order to simulate particles in saltation mode, the following condition must be respected (Naaim-Bouvet, 1998):

$$\frac{u_f}{u_{*,t}} > 1 \tag{4}$$

The threshold speed and the final speed of the particle may be theoretically determined with the following relationships:

$$u_{*,t} = A\sqrt{\frac{\rho - \rho_a}{\rho_a} \cdot g \cdot D} \tag{5}$$

where A is a parameter depending on the internal friction angle of the particle material and on the turbulence of the entraining flow, ρ is the density of the particle in saltation motion, ρ_a is the density of the air, g is the gravity constant and D is the particle diameter.

For the Reynolds number $\mathrm{Re} = \frac{u_{*,t} \cdot D}{\upsilon} > 5$, $A = 0.118$, while for $\mathrm{Re} < 5$, $A = 0.1...100$.

$$u_f = \frac{\upsilon \cdot \mathrm{Re}}{D} \tag{6}$$

Valembois' iterative process developed on sand particles was applied on the glass beads to obtain the final falling speed of these particles. A „parameter of the particle" was found:

$$G = \frac{\rho - \rho_a}{\rho_a} \cdot g \cdot \frac{D^3}{\upsilon^2} \tag{7}$$

where υ is the kinetic viscosity; the parameter G is used for the determination of the Re numbers (Michaux, 2003).

Unlike u_*, whose value depends on the wind turbulence characteristics, both the threshold speed and the final speed of the particle are not expressed explicitly based on the wind speed, being determined from the kinematic equilibrium of the particle at the beginning and at the end of the movement, respectively. These two last speeds that characterize the movement of the particle in air depend on the density, mean diameter of the particle and, finally, on its Reynolds number.

The proportion between inertia and gravitational forces, which means the similitude between trajectories of movement of the snow particles and the model particles, known as Froude's criterion, is expressed in the following form (Leitl *et al*, 2006).

$$\frac{v^2}{D \cdot g} \cdot \frac{\rho_p}{\rho_p - \rho_{air}} \tag{8}$$

In relationship (8), v (m/s) is the wind speed in the drifting direction.

A key role in a successful scale modelling in laboratory of the wind transportation of snow relies in a prior analysis of the characteristics and behaviour of the material that simulates the snow particles and, in this respect, studies on simplified physical models help the identification of the involved parameters.

In the Building Aerodynamics laboratory at the Faculty of Civil Engineering in Iasi, the modelling of snow particles by glass beads showed a good similarity with all criteria excepting Froude's criterion. Relevant studies (Naaim-Bouvet, 1998; Naaim-Bouvet, 2002), show that the lack of similarity of Froude's number may be tolerated, while still reaching the geometrical similarity of a snow drift between the model and the prototype, if the surface shear stress distribution is not sensitive to the sudden changes in the wind profile and the trajectories of the particles are small in comparison with the dimensions of the modelled structure.

The experiment is based on the erosion technique of a uniform layer of 2 mm of particles of glass beads with diameters of 0.2...0.4 mm, distributed on the surface of the roof. The roof perimeter has an edge outlined with a 2 mm vertical band that simulates the element used to prevent the snow drift from sliding and dropping down.

Important studies from the last years (Thiij *et al.* 1999; Thiij, 2003) demonstrate that derived similarity requirements may be associated with the simulation in wind tunnel of the snow transportation.

One basic parameter that arises from the necessity of simulating the phenomenon is the modified roughness length, $z_0^{'}$, which defines the shape of the wind speed profile in the proximity of the surface covered with snow and is obtained from the application of the logarithmic law of variation of the longitudinal component of the wind speed profile. The value of the modified roughness length may be determined with the following relationship:

$$z_0^{'} = e^{\frac{u(z_2)\ln(z_1) - u(z_1)\ln(z_2)}{u(z_2) - u(z_1)}} \tag{9}$$

where:

- $u(z_1)$ and $u(z_2)$ are the values of in-wind speed determined in two locations in the proximity of the model of the building;
- z_1 and z_2 are the related heights where the speed was determined, one above the surface of the snow layer and the other being the reference height (usually the height of the building).

The simulation at scale of the wind speed profile over the snow surface implies that the following relationship, derived from the original Jensen's number, is respected (Cook, 1985):

$$\left(\frac{z_0^{'}}{h}\right)_{\mathrm{mod}\,el} = \left(\frac{z_0^{'}}{h}\right)_{nature} \tag{10}$$

The value of the modified roughness length, $z_0^{'}$, may then be used for the determination of the friction velocity based on the same log-law of variation of the in-wind speed with the height:

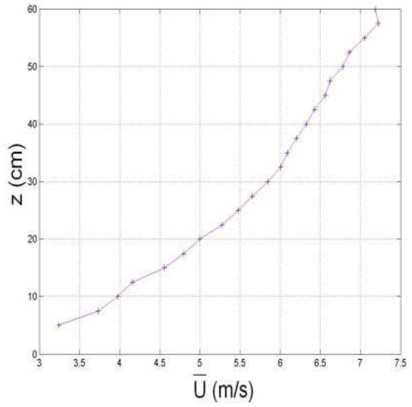
$$u_* = \frac{u(z)\cdot k}{\ln\left(\frac{z}{z_0^{'}}\right)} \tag{11}$$

3. STUDY OF THE PARAMETERS OF THE SNOW DRIFTING SIMULATION

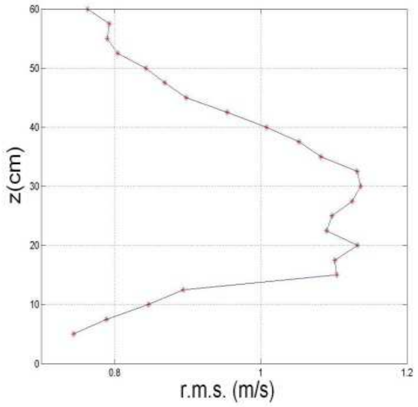
3.1. Physical Simulation of the Snow Drifting on a Flat Terrace of a Building

The open return tunnel is situated in the Laboratory of Buildings Aerodynamics of the Civil Engineering and Building Services Faculty, having a cross-section of 1.4 m x 1.4 m and a length of 10.8 m.

A boundary layer specific for the urban exposure is developed in the tunnel and the characteristics of the simulated turbulent flow are presented in Figure 2 (the vertical profile of the longitudinal mean wind speed, turbulence intensity, standard deviation). At the reference height of the model (height of the roof), the turbulence intensity $\sigma_u / \overline{u}_z$ (%), is about 20%...24%, specific for the urban area and the mean wind speed has a power law coefficient $\alpha = 0.33$. The geometric scale is set to 1:400. A 2.5 mm-deeep layer of glass beads, simulating a uniform deposit of snow, is spread on the top of the model, which plays the role of a flat roof (Figure 3).



a)



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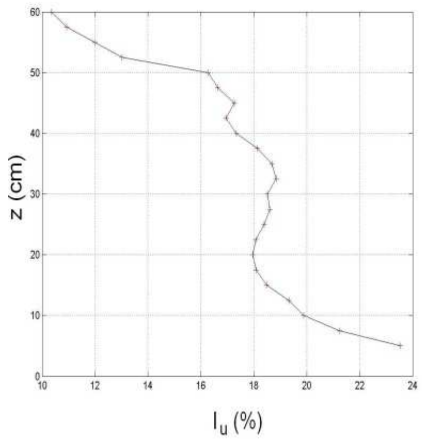


c)

Fig. 2. Characteristics of the wind speed profile in the wind tunnel (urban exposure roughness): a. mean wind speed; b. standard deviation, c. turbulence intensity

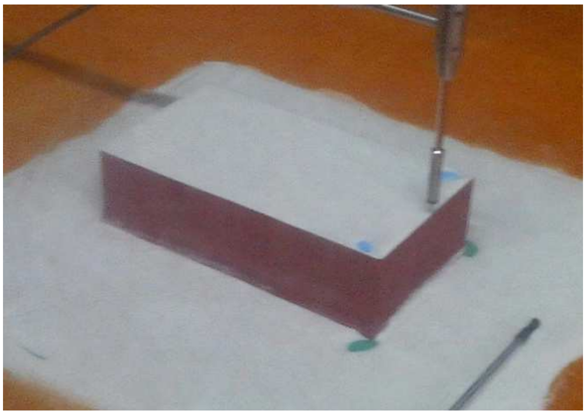
Roughness length associated with the drifting experiment was determined by setting the height z_1 at 5 mm above the surface of the floor in the vicinity of the model of the building and z_2 at the reference height, at 7 cm from the floor, which is the eave level of the model.

Fig. 3. The model placed in the tunnel and the three hot wire probes that measure the wind speeds, v_0, v_1 and v_2

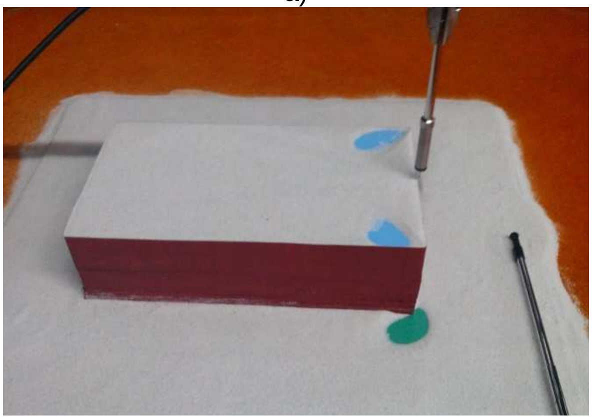
The experiment consisted of several episodes of drifting the particles from the roof under wind action in two positions: with the narrow face (case A) and with the wide face (case B) normal to the wind direction, respectively (Figure 4).

The wind speeds v_1 and v_2 were measured with two hot wire mobile probes placed in the axis of the tunnel and median plane of the model at the heights z_1 and z_2 and increasing in steps (Table 1). The reference speed v_0 was determined from the third equipment placed in the position of measurement of the reference pressure in the tunnel (in front of the model, in the longitudinal axis of the tunnel, at the reference height) The sensitivity of the probes allowed to obtain the averaged values of the measured samples of speed (frequency of acquisition of 2 samples/sec.) and also to display the extremes of the instantaneous values.

Every step of speed increase lasted several minutes until significant events occur, including the visualization of saltation and transport of particles in specific places, associated with the modifications of the incoming flow in contact with the model (Figure 4).



a)



b)

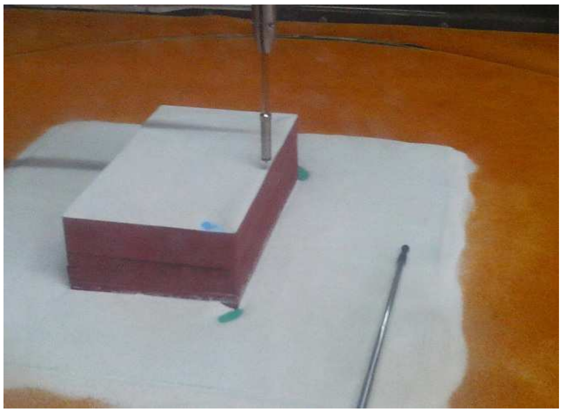
Fig. 4. Stages of the experiment in the case A: a) speeds corresponding to the formation of ablation zones; b) final speeds corresponding to the maximum dimensions of the ablation zones

Table 1. *Speeds registered during the experiment in the wind tunnel and time intervals*

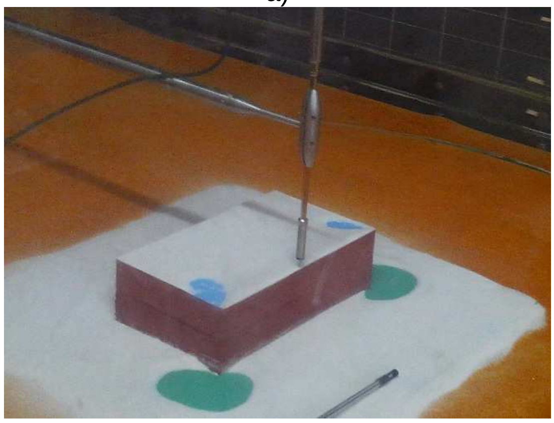
Direction of wind action	Steps of speed varia-tion	Speed values (m/s)			Dura-tion
		V_0	V_1	V_2	
Normal to the narrow face	1…4	1.26… 3.43	0.76… 1.28	2.03… 3.99	2.5 min … 5.5 min
Normal to the wide face	1…6	1.23… 3.70	0.72… 1.50	2.22… 4.95	3.5 min … 5 min*

*The last step corresponds to an extension of duration by 20 minutes in order to observe the saturation of the drifts

A blurry appearance of the image may be observed in Figures 4.a and 5.b, showing the drifted particles in the air around the model of the building.



a)



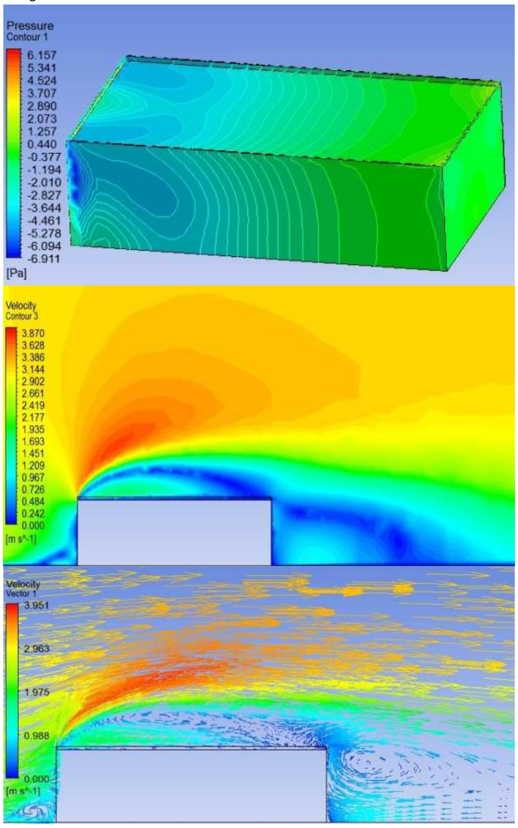
b)

Fig. 5. Stages of the experiment in case B: a, b – development and growth of the ablation zones

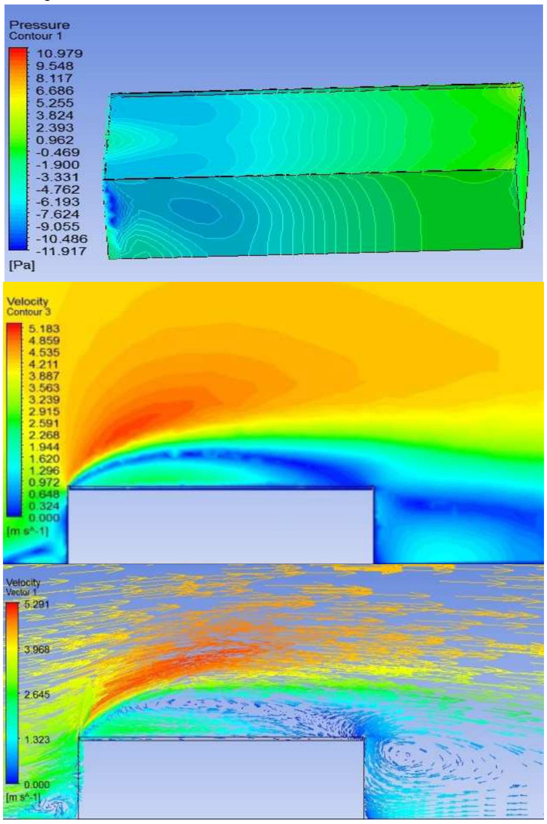
3.2. Numerical Model of the Wind Flow on the Flat Terrace

The numerical simulations in ANSYS program of the wind flow over the model of the building were developed in parallel with the experiments on the physical model, the purpose being to observe and analyze the flow pattern and the local speeds at particular locations associated with the transportation of the particles. The simulations were developed having in view the same situations as in the physical simulation stages, firstly the wind incoming flow acting normal to the narrow face (Case A), and, secondly, normal to the wide face (Case B). The simulations were developed by setting the speed values in increasing steps for the both above-mentioned situations (Fig. 6).

v_0 = 3 m/s

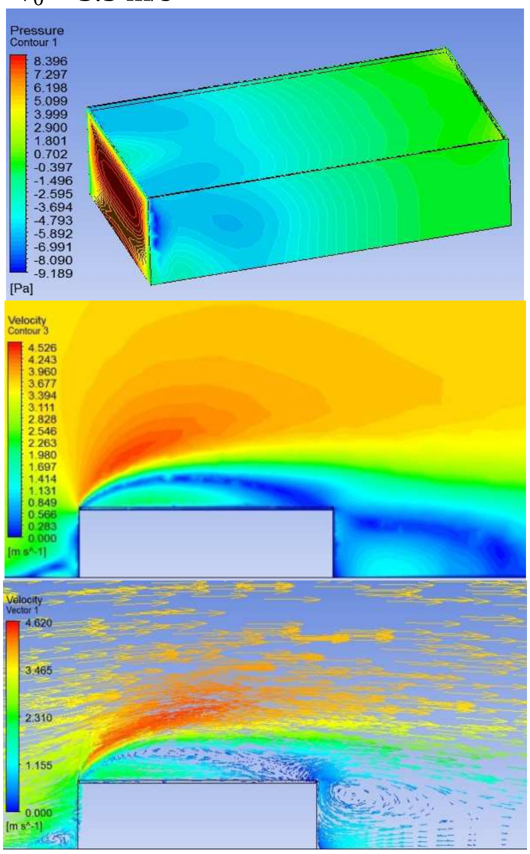


v_0 = 4 m/s

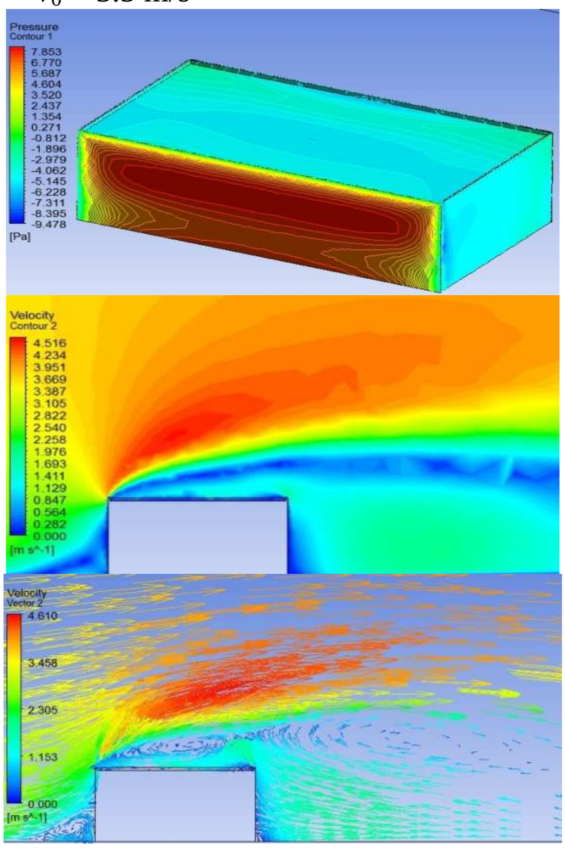


a)

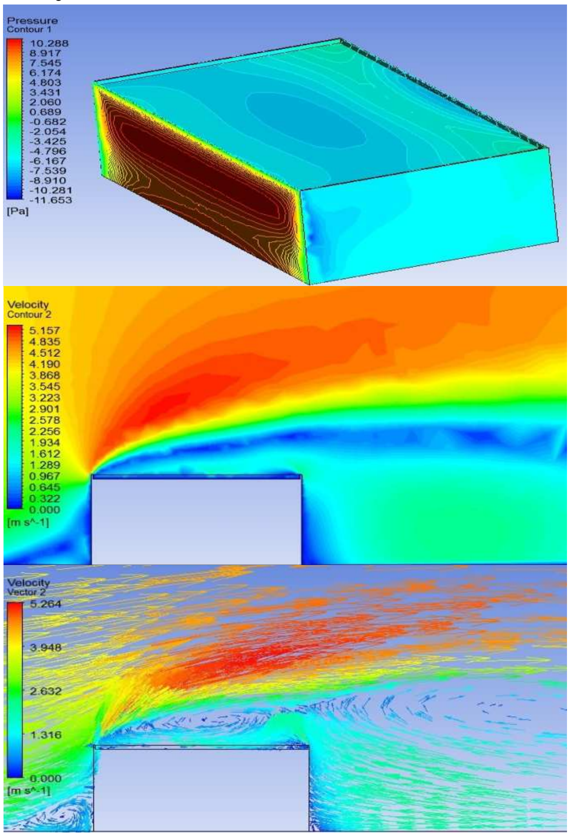
v_0 = 3.5 m/s



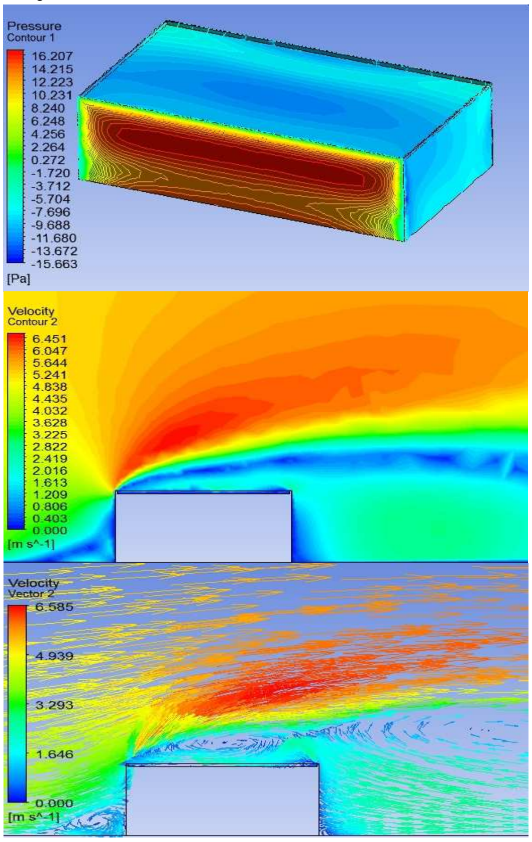
v_0 = 3.5 m/s



v_0 = 4 m/s



v_0 = 5 m/s



b)

v_0 = 4.5 m/s

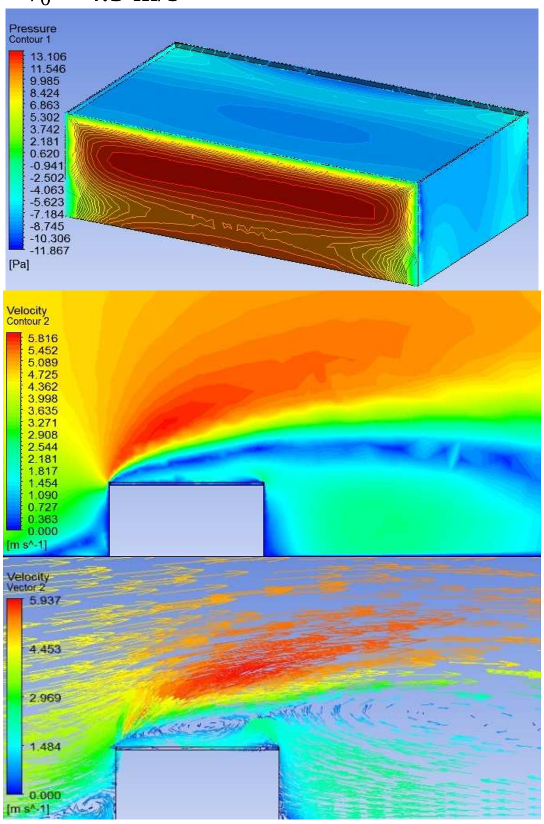


Fig. 6. Screen captures showing the wind pressures and speeds for the two studied cases: a) case A: wind acting normal to the narrow face; b) case B: wind acting normal to the wide face

4. RESULTS AND DISCUSSION

Glass beads were used in previous research experiments in the Building Aerodynamics laboratory at the Faculty of Civil Engineering in Iasi, mostly related with simulations of the snow agglomeration on communications infrastructure (Iversen *et al.* 1990). The model material was found to suit well the simulation because it contains particles with different aspects, similar with the snow that presents itself flakes with various dimensions and aspect. The characteristics of the material that models the snow in laboratory and the snow itself are presented comparatively in Table 2.

The involved similarity criteria, verified also in previous studies, show that glass beads may be satisfactory for modelling the snow transportation, although Froude's number does not match with the prototype; this is mainly because the good fitting between the threshold speed of the particle and the final speed of falling, theoretically determined, with the data provided in the experiment (Teleman, 2014). These values were compared with data available in literature; examples are given in table 3 (Michaux, 2003, Thiij, 2003).

Table 2. *Comparative characteristics of the model particles and of the snow used in the tests (2)*

Characteristics	Glass beads	Snow
Density [g/cm^3]	ρ_m =1.308	ρ_s [1)]= 0.3
Particle diameter [mm]	0.2...0.4	0.15...0.5
[1)] Specific weight of snow varies between 0.12...0.2 g/cm^3 for fresh snow to 0.45...0.55 g/cm^3 for old snow		

Table 3. *Results of simulating the snow drifting parameters in the wind tunnel and at natural scale*

Nr. crt.	Relationship verified	In wind tunnel	Observations
1	(2)	89.58	Relationships verified
3	(3)	0.023	
2	(4)	1.58/0.172= 8.8*	

*The values involved in the verification are determined for the glass beads used in the experiment, being: $u_{*,t} = 0.172\,m/s$ and $u_f = 1.58m/s$ (2); other reported values in the literature are: $u_{*,t} = 0.093m/s,$ on glass beads in laboratory (11); $u_f = 1.0m/s,$ on snow particles with diameter of 0.15mm (5).

From the numerical simulation of wind flow over the flat roof of the cuboidal model some aspects may be observed:

- as already foreseen, the flat roof is subjected mainly to negative pressure values (suction) highly increasing in the vicinity of the in-wind edge and speedily decreasing downwind; the flow reattaches close to the extreme edge downwind and wind pressure changes the sign becoming positive;
- the dimensions of the in wind face prevail upon the pattern of the flow over the roof; the wider the edge exposed, the more extended the area under important negative pressure values;
- the “cut through” plane crossing the separation steam lines displays the zone under the separation bubble where the shear stresses reverse their sign considering the wind direction; there, the erosion of the particles layer causes a close agglomeration parallel to the edge; particles are entrained in erosion and transportation farther from the in wind edge.

The wind speeds that determine the occurrence of the transportation phenomenon and the growth of the particle deposits were obtained, their values being used in equation (6) for the calculation of the modified roughness length. Similarity criteria of the wind profile and turbulence obtained by applying equation (10) are presented in Table 4, where available data are also added for comparison. It must be mentioned here that the majority of the test in wind tunnels do not consider the wind speed profile specific for urban exposure, due to the final aim and destination of the scientific studies (railroads, open spaces or other environs exposed to other profiles of in wind speed and turbulence).

Table 4. *Values of modified roughness length zo´and of Jensen’s number*

Study	$Z'_{0\,model}$ (eq.6) (m)	$\left(\frac{z'_0}{h}\right)_{model}$	$Z'_{0\,nature}$ (m) resulted from scaling	Values of Z'_0 in Literature
Case A	0.00103… 0.00144	0.0147… 0.0205	0.412… 0.575	0.0012… 0.58, on snow surface (Florescu, 2001); 0.0001 on glass beads, tunnel (Inversen, 1990) 0.0002 on snow (Michaux, 2003)
Case B	0.00141… 0.00159	0.0201… 0.0227	0.564… 0.635	

The variation of the modified roughness length z_0', with respect to the reference speed in the two studied cases, case A and case B, is presented in Figure 7.

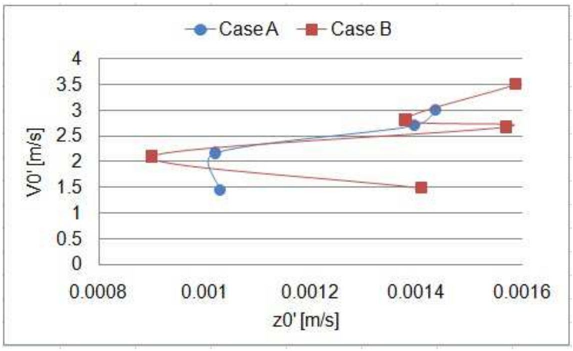


Fig. 7. Roughness length z_0' with respect to the reference speed value, v_0

The modified roughness length increases if the wind reference speed increases: while incident wind speeds grow 2 times the roughness length z_0' have a slower growth, up to 1.5 times. The absolute values depend on the two considered situations, case A and B, respectively; at the same time, it can be observed that both the roughness length and the friction speed values are scattered on a wider domain in the case of wind acting on the wide face (case B), suggesting that the value is strongly dependant on the pattern of the flow field over the roof.

In wind friction speed was then determined with equation (Anno, 1984) for both cases A and B; the results are presented in the plot in Figure 8, showing also an increase of about three times of the friction speed with the increasing roughness length. All the speed values were determined in the median plane and, in particular, the speed v_2 was measured quite close to the point where the streamlines detach from the edge model, avoiding the direct influence of the turbulence created by the presence of the model in the wind field. The wider spreading of the individual values of the friction speeds in case B as compared case A can be observed, although the roughness lengths are maintaining within the same limits for the two cases considered, suggesting a strong dependence of the friction speed values upon the divergence of the flow in contact with the model of the building.

Friction speeds reported in literature, either on snow surface, in nature or in laboratory, are found in the interval 0.2 m/s … 0.9 m/s, rarely exceeding 1 m/s.

The last value of friction speed for case B corresponds to saturation of the particles drift; the relevance of this absolute value would be, however, pointed out only if a parallel experiment would be performed, with wind acting constantly from the beginning with maximum values and then the values obtained could be compared.

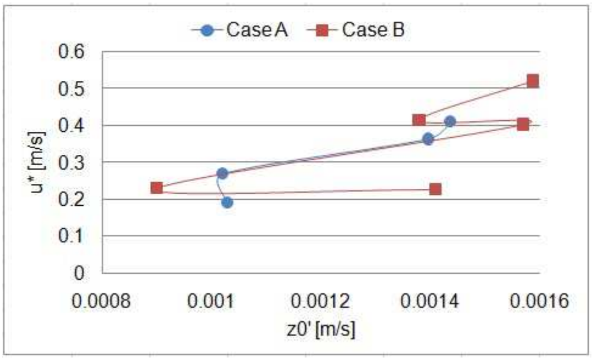


Fig. 8. Friction speed u^* depending on the roughness length z_0'

The formation and the extension of the “delta wings”, that is the lateral vortices in the two in-wind corners, is put in evidence by the transportation episodes intercepted in Figures 4 and 5, showing the major influence of the local turbulence upon the drifting occurrence. Although physical measurement of the friction speeds is not possible right in these ablation areas because of the alteration of the wind flow by the presence of the equipment, it is easy and practical to predict the event when “critical” wind speeds v_2 are reached at the point of separation of layers.

5. CONCLUSIONS

The paper focuses on the determination and analysis of the parameters involved in the process of modelling the snow transportation and drifting from the roofs of buildings placed in urban texture.

Wind tunnels are best fitted for reproducing this phenomenon but the criteria involved in modelling at reduced scale ask for prior studies dedicated to the accuracy of the parameters obtained via experiments. According to (Iversen *et al.* 1990), the essential parameters in the simulation of snow drifting are the mean wind speed in the separation layer and the mean friction speed at the height of the model (reference height).

In the absence of real possibilities of measuring directly the threshold friction speed and the final speed of the particles, the roughness length and the friction wind speed play key roles not only from the point of view of the scale modelling, but also in generating the transportation of the particles, all the other parameters relying on the correctness of their values.

From the presented analysis it results that it is of major importance to set the relevant in wind speed for a specific situation, and also the time interval for exposure to wind action, because they directly affect the parameters of the simulation of snow transportation by wind action.

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