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Design of Floor and Stair Case Stone for Solution to Slip and Fall Accident

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ABSTRACT

It is very dangerous case to slip and fall incident while walking in smooth texture of manmade or natural granite and other polished floor and stair case stones. Here coefficient of friction is less than 0.5 when laying surface to wet, oil, ice etc, this condition which results falling action, usually old age peoples suffers lot of problems, and middle age peoples recovers from falling because of their muscle stiffness. Nowadays almost everyone are using granite stone which looks attractive and these are very dangerous. The failure of material is so common in smooth texture compared to rough one. Further this paper will predict high COF stones yielding lesser amount of falling and slipping.

Keywords : Rough Texture Pattern, 3d Sample, Analysis, COF

I. INTRODUCTION

SLIPPING : Slipping happens when friction between feet and walking surface is not large enough to prevent your back foot from sliding as it pushes off, or the front foot from sliding when it tries to slow the forward motion of your center of gravity). Together, normal force and friction provide the forces necessary to support the body and maintain balance. For example, friction prevents crutches from sliding outward when they aren't held perfectly vertical. Friction is also necessary for locomotion, such as walking and running, as we will learn in the Locomotion unit.

Friction : Friction is the force that resists surfaces sliding against one another. Rub your palms together, the resistance you feel is friction. Complimentary to normal force, which only points perpendicular to surfaces, friction only points parallel to surfaces. Two surfaces must touch to have friction, so you also can't get friction without normal force. In fact, frictional force is proportional to normal force.Rub your palms together. Now push your palms together hard and try to slide them at the same time.Now the normal force is larger causing the frictional force to grow in proportion. Friction between the crutches and the floor prevents the young boy's crutches from sliding outward even when they aren't held straight vertical.

Addition of low COF fillers such as graphite, hexagonal boron nitride, PTFE, paraffin wax, or molybdenum disulfide will reduce the COF. If the friction mechanism changes from typical shear deformation of contact point into friction of scraping a trench on the surface, then the friction coefficient may increase because of load increasing. By using lubricants or powder between the surfaces, friction is reduced

Types of stones

Marble, Granite, Slate, Limestone and Travertine

Man made

Engineered Quartz slabs or Porcelain slabs. Each of which have been fabricated using specific and often closely guarded manufacturing processes to ensure that both types will perform as per the design criteria of the manufacturer.

The different types of artificial stones are as follows: Concrete Block. Ransom Stone. Artificial Marble. Concrete Block. ,Ransom Stone. ,Artificial Marble,Bituminous Stone,Victoria Stone,Imperial Stone, Garlic Stone.

Granite floors are one of the most popular types of stone flooring; granite is also often used for kitchen countertops and in some bath environments. Limestone: Limestone is formed of sedimentary material quite often including coral and shells, and occurs naturally in a variety of subtle colors.

Fig 1. Granite stone

slipping force:

The point of sliding occurs when the upper limit of the frictional force is reached, i.e. $F = \mu R = mg \sin \theta$. $mg \sin \theta > \mu R$ and $F = \mu R$.

Sliding friction:

$\mu_{ss} =$ F_{ss}/N

where: μ_{ss} is the static coefficient of sliding friction for the two surfaces (Greek letter "mu") F_{ss} is the static force of sliding friction. N is the normal or perpendicular force pushing the two objects together.

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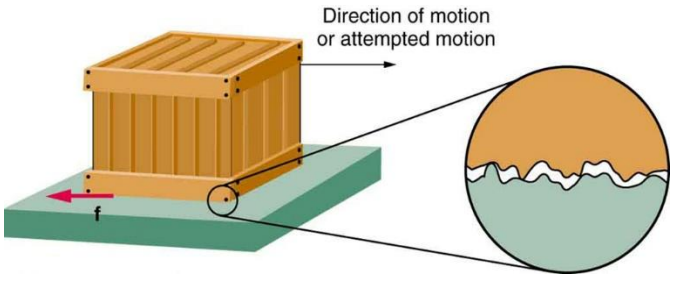
Table of static and kinetic friction coefficients for various surface pairs

System	Static+friction, μ_s	Kinetic+friction, μ_k
Rubber on dry concrete	**1.0**	**0.7**

Table of static and kinetic friction coefficients for various surface pairs

System	Static+friction, μ_s	Kinetic+friction, μ_k
Rubber on wet concrete	0.7	0.5
Wood on wood	0.5	0.3
Waxed wood on wet snow	0.14	0.1
Metal on wood	0.5	0.3
Steel on steel (dry)	0.6	0.3
Steel on steel (oiled)	0.05	0.03
Teflon on steel	0.04	0.04
Bone lubricated by synovial fluid	0.016	0.015
Shoes on wood	0.9	0.7
Shoes on ice	0.1	0.05
Ice on ice	0.1	0.03
Steel on ice	0.4	0.02

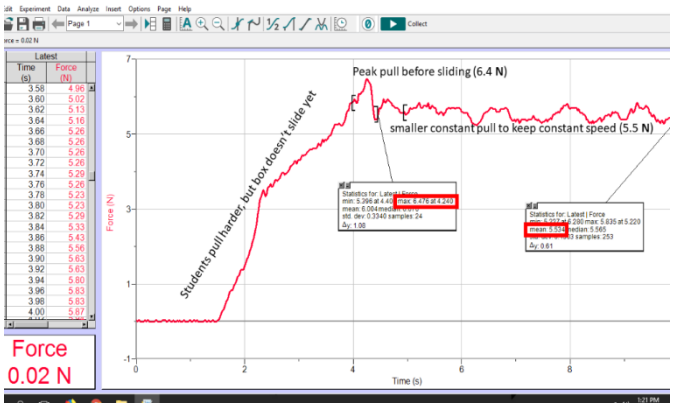


Frictional forces always oppose sliding . Friction arises in part because of the roughness of the surfaces in contact, as seen in the expanded view. In order for the object to move, it must rise to where the peaks can skip along the bottom surface. Thus a force is required just to set the object in motion. Some of the peaks will be broken off, also requiring a force to

maintain motion. Much of the friction is actually due to attractive forces between molecules making up the two objects, so that even smooth surfaces are not friction-free. The roughness and adhesion of the surfaces determine the coefficients of friction (μ).

KINETIC FRICTION:Kinetic friction acts whenever two surfaces are sliding past one another and typically the size of the kinetic friction does not depend on the relative speed between the sliding surfaces. If an object is sliding, but there not another force pushing the object to keep it sliding, then kinetic friction will eventually stop the sliding object. (Give an object a shove so that it slides across the floor and it will eventually stop. That is kinetic friction at work).

STATIC FRICTION:Unlike kinetic friction, static friction does not have a constant value. Instead, static friction adjusts to prevent the surfaces from slipping, but it can only do so up to a maximum value. If the force required to prevent slipping is larger than the maximum static friction value, the object will slide and kinetic friction takes over. Static friction is larger than kinetic friction. The following graph of force vs. time demonstrates the process of "breaking free" of static friction between two surfaces. The graph was created by measuring the force that students applied to a box sitting on a table by pulling on a string tied to the box.



Pull force applied to a box on a table. The students pulled lightly at first, then increasingly harder until the box began to slide, and then pulled just right to keep the box moving at constant speed. Notice that as the students pull harder the box has not yet move, which means the static frictional responds and grows larger to prevent sliding from occurring. A maximum of static frictional force of 6.4 **N** is reached before the box begins to slide and kinetic friction takes over.

II. CONCLUSION

In this paper we provide an outline of topological indices of line graphs of friendship graphs. The study seems to be promising for further studies as these indices can be computed for many graph classes, derived graphs and molecular structures.

III. CONCLUSION

- Failure of stone is much more in smooth texture of less coefficient of friction
- Failure of stone is less in rough texture of high coefficient of friction
- Increasing coefficient of friction is usually by rough surface not polished stones
- Eventhough applying wet, liquid, oil on high coefficient of friction surface stones reduces slipping
- Avoiding smooth polished stones reduces slipping
- Making the surfaces rough.enhances friction
- By pressing the surfaces harder against each other (by increasing normal force). enhances friction
- By removing the lubrication between the surfaces in contact. enhances friction
- By using sliding motion rather than rolling motion. enhances friction
- By increasing the surface area in contact enhances friction
- Friction can be increased by making the surface

irregular.

- By increasing the mass of the object that is causing friction, increases friction

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