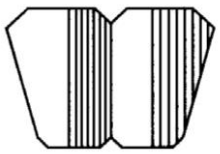
THEMATIC RESEARCH II

Annual Report on Research Activities

Abstracts in English



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Observation of the behavior of the liquid surface in osmotic experiments using high concentration sucrose solutions

Yudai Masui, Kimitada Oku, Masaki Sakai

Abstract

We wondered how the osmotic pressure in highly concentrated solutions differs from that in dilute solutions. In this study, we used an osmometer and aqueous sucrose solutions of various concentrations to investigate the displacement of the solution`s surface level during the osmotic phenomenon. As a result, the rate of rise of the surface level tended to increase as the concentration increased. The change in the rate of rise of the surface level became smaller at higher concentrations. When sucrose solution and cellulose membrane were used in the osmotic pressure experiment, it was found that the surface level of the solution's surface level surface rose, then began to drop, and after a short time, the surface level began to rise again due to the solvent passing through the membrane and the change in the properties of the solvent.

***Keywords*: highly concentrated, osmotic pressure, sucrose, cellulose**

The Relationship between the Particle Size of Samples and the Colors of Products on Generating Gummy Sulfur

Shojiro Murai, Takateru Sato, Shinichi Umehara

Abstract

Gummy sulfur, also called amorphous sulfur, is one of the allotropes of sulfur. A picture of dark brown gummy sulfur is printed in the basic chemistry textbook published by Tokyo Shoseki, but the National Institute of Technology, Tsuruoka College, reports that gummy sulfur generated from 99.5% pure sulfur is yellow. Also, Ehime Prefectural Matsuyama Central Senior High School reports that sulfur with a large particle size can turn into yellow gummy sulfur. We generated gummy sulfur from 98%, 99.9%, and 99.99% pure sulfur powder, but all of them were dark brown regardless of the purities of sulfur. Therefore, we hypothesized that it is not purities but the particle size of sulfur that affects the colors of gummy sulfur. We generated gummy sulfur from 99.9% pure sulfur powder, granular parts taken from sulfur powder, sulfur granule, and grained and sieved sulfur granule. We represented the colors of gummy sulfur in 8-bit RGB color codes to compare them. According to our results, the colors of gummy sulfur generated from sulfur powder, granular parts of powder, sulfur granule, and sieved sulfur granule are dark brown (#171517), brown (#6F602D), yellow (#E5E73C), and dark red (#794D30) respectively. These results indicate that the color of gummy sulfur approaches yellow as the particle size of sulfur increases. Also, it is suggested that gummy sulfur can be close to red, which is between yellow and dark brown, when the particle size of sulfur is larger than sulfur powder and smaller than sulfur granule.

Keywords: **Gummy Sulfur, Particle Size, Dark Brown, Yellow, Dark Red**

Blocking UV rays with plants ~Production of sunscreen using polyphenols~

Chihana Enomoto, Yuika Kawamura, Ruma Kondo, Saki Shimada

Abstract

Many sunscreens on the market contain UV-scattering agents and UV-absorbing agents, and the latter can be irritating and have adverse effects on some people. We have learned from previous studies that polyphenols contained in squash peels, onion peels, and rosemary exhibit high UV-protective effects and that the wavelength of their peak absorbance varies with the sample. Thus, therefore, the purpose of this study was to prepare sunscreens from these samples that can protect against a wide range of UV light wavelengths without chemical substances, and to compare the effectiveness of these sunscreens. First, extracts were obtained from the samples and the absorbance spectrum were measured at constant polyphenol concentrations. Next, sunscreen creams were prepared using the extracts, and the values of the amount of UV light prevented by the UV checker and the absorbance spectrum were measured. As the wavelengths of onion peels is longer, the absorption spectrum becomes lower. Squash peels showed higher values than the other two samples near 400nm. Rosemary had the highest value of the three samples at short wavelengths. Both characteristics showed up in the absorption spectrum of the solutions of the two mixed extracts. Onion peels and rosemary were highly effective at long wavelengths. From these experimental results, we can say that the sunscreens made from onion peel or rosemary extract are more effective in preventing ultraviolet rays among the three samples.

Keywords: **UV-rays, sunscreen, polyphenol, absorption**

Quantitative analysis of d-Limonene by redox titration
~How much does a citrus peel include d-Limonene?~

Rina Fukui, Eri Hiwatashi, Rion Inoue, Nina Yamada

Abstract

A method called Gas Chromatography (GC) was established from 1957 to 1959 that enables us to quantitate the amount of d-Limonene, which is included in a citrus peel. However, because we don't have the detector for GC in our high school's laboratory, we can't determine it. So, after we made a hypothesis that d-Limonene would act as a reducing agent in redox titration, we aimed to establish methods to quantitate it without using the detector. First, we tried steam distillation to quantitate d-Limonene, but the results were contrary to our hypothesis, with d-Limonene receiving electrons. So, we devised a lot of ways such as using solution dissolved potassium permanganate ($KMnO_4$) by acetone, and employed samples derived by the same solvent. In the experiment of using a steam distillation sample, the amount of $KMnO_4$ aq dropped was 23.6 mL for 20 g of orange peel. In the experiment of organic solvent extraction, we couldn't get the end point by titration. Even though the color of the solution had changed, and some deposit had produced, the color returned to colorless as the time went by. It was when we dropped 12.7 mL of $KMnO_4$ aq that precipitation started. These results of the experiment indicate that steam distillation is not suitable for the quantitating of d-Limonene, and, in the way of titration by a using sample of solvent extraction, we couldn't conduct the desirable reaction regardless of the solvent of redox titration. Therefore, we concluded that quantitating the amount of d-Limonene by redox titration instead of GC is difficult.

Keywords: **d-Limonene, Redox Titration, Solvent Extraction Method, Organic Solvent, Steam Distillation**

The conditions for plant movement ~Biological reaction of sleeping grass and dancing plant to stimuli~

Miho Adachi, Yuka Hata, Yukino Tanabe

Abstract

We already know that sleeping grass and dancing plant, which are representative examples of moving plants, respond to sound, heat, and physical contact. We wanted to clarify what other types of stimuli trigger responses in moving plants. In the experiments of temperature, we set the temperature from 15℃ to 40℃ and observed them. In the experiment of LED light, we observed them under red light, blue light, green light, white light, and darkness. Sleeping grass and dancing plant tended to move a lot when the temperature was high. Sleeping grass reacted strongly to the darkness and the green light but was less responsive to the blue light. Dancing plant reacted strongly to the blue light but was less responsive to the darkness, the green light and the white light. In conclusion, it is found that the higher the temperature is, the more active the moving plants are, that the leaves of sleeping grass close when there is no light, and that the leaves of dancing plant become more active when exposed to the red and the blue light.

Keywords: **Sleeping grass, Dancing plant, temperature, light**

Analyzing the Relationship Between Hitting and a Crop of Mushroom

Haruna Kasanaka, Ran Kataoka, Aki Nishimura, Reno Shitsuji

Abstract

It has been reported that hitting logs increases the yield of shiitake mushrooms before they start growing. We think that similar results could be obtained with mushroom cultivation. First, we cultivated shiitake mushrooms, and measured the number and weight of the shiitake mushrooms and the weight of the fungus beds. Next, we hit 2 of the 4 fungus beds, and compared the difference in the second harvest of shiitake mushrooms between beaten and unbeaten fungus beds. Although, between the second and the third yields, the yield of hit mushrooms decreases by 0.05g, and that of non-hit mushrooms increases by 2.4g on average, there are no marked differences in the weights of the fungus beds and the number of mushrooms. From our results, we couldn't reveal that hitting helps mushrooms grow better. We have hit only 2 fungus beds, so their individual differences affected our results more greatly than we had expected, and we couldn't have accurate results. Therefore, in the future we would use more fungus beds in order to have reliable outcomes.

Keywords: shiitake mushrooms, hitting, mushroom fungus beds

Verification of responses of limbless organisms to various stimuli

Haku Kimura, Koyu Tanemura

Abstract

Researchers have studied the irregular movements of humans and other organisms, calling them physiological regularities. However, they have never verified the regularity of their irregular movements. The goal of these experiments is to find physiological and physical regularities in the irregular movements of limbless organisms. Two invertebrates were used in these experiments. One was earthworms and the other was planaria. We explored this by conducting controlled experiments, observing, and analyzing the differences between the earthworms' normal movements when the surrounding environment is changed and when their movements are normal. The results showed that there were differences in the earthworms' movements under various conditions. Planaria are said to be immortal because of their high regenerative capacity. However, no matter how high their regenerative capacity is, does continuous cutting cause some changes in their cells? We used a total of 56 planaria in our research. However, they were very sensitive creatures and died en masse due to mold and desiccation twice. Some of them survived. We think there was some degree of tolerance in them. The two experiments showed that physiological or physical regularities exist in limbless organisms. Unlike the limbless creatures and humans, which have been demonstrated to date, the discovery of regularity in limbless creatures opens the possibility of regularity in all living organisms.

Keywords: **limbless, earthworm, planaria, regularity,**

Antibiotic Bactericidal Action of Tea Against E-coil

Honoka Kawamoto, Atushi Kokubo

Abstract

We recently heard a news story about the antibacterial properties of green tea, and we wanted to find out if this is also true for bottled green tea. We conducted two experiments in order to test the antibacterial properties of bottled green tea. First, we grew E. coli in a liquid medium containing each sample, and measured turbidity by using a spectrophotometer. Second, we grew E. coli on an agar medium containing the samples and measured the number of E. coli colonies. In Experiment 1, the ambience increased from 0.165 to 0.305 (OD_{550}) in the LB liquid medium added bottled green tea. On the other hand, it increased from 0.165 to 0.184 (OD_{550}) in the LB liquid medium added sterile water. In Experiment 2, there was no colony in the LB liquid medium added bottled green tea or sterile water, or in only sterile water. Through these results, we consider that bottled green tea doesn't have antibiotic action, and that sterile water killed E-coli. We hypothesize that osmotic pressure may have destroyed the cell membrane.

Keywords: Bottled Green Tea, antibiotic action, E. coli K12

Relationship between light color and plants growth
~By using colored cellophane and Komatsuna~

Waka Adachi, Kana Ohara, Fumi Sugiura

Abstract

Experiments about the relationship between light color and plants growth by using LED lights are conducted. These kinds of experiments show that a different color causes different growth reaction depending on plant species. However, experiments using LED lights are difficult in my school. Thus, we predicted that we could research such a relationship by using colored cellophane. We selected Komatsuna as a research subject and cultivated it in 50 ml conical tube in order to meet the conditions. Also, we used artificial weather machine set the temperature to 22 degrees Celsius and lighting 10 hours. We covered with red, blue, green, and colorless cellophane in the framework two weeks after we seeds the plants. We prepared four individuals per one color and another set with no cellophane. The result shows that red cellophane cause Komatuna's longer leaf stalks and smaller leaf sizes. However, we had only one experiment, so the result is not positive.

Keywords: **light color, growth reaction, colored cellophane, Komatuna**

The effect to amphibious plants by controlling water level ~The conditions for heterophylly expression of *Callitriche palustris*~

Hiroki Inari, Ouki Shimizu, Motoki Yoda

Abstract

Callitriche palustris (*C. palustris*) is one of the plants which has heterophylly, an ability to change the shape of their leaves depending on whether they live on land or in water. This study aimed to discover the timing when which the shape of leaves formed is decided, by changing the water level while growing. We raised *C. palustris* under various conditions, including raising the plant which has terrestrial leaves underwater. As a result, *C. palustris* right out of seeds hardly grew underwater, and the plant needed to be underwater for at least one week to form underwater leaves. These results indicate that *C. palustris* basically grows with terrestrial leaves unless being underwater for a long time, and that it develops underwater leaves under specific conditions.

***Keywords: C. palustris,* underwater leaves, terrestrial leaves, heterophylly, amphibious plants**

Changes in the Rate that Pill Bugs Maintain Turn Alternation ~Due to Differences in the Environment Faced Immediately Before~

Sarari Aoyama, Suzuha Ebata, Ayu Nagamoto, Satori Yamashita

Abstract

Our purpose is to increase the maintenance rate of turn alternation in Pill Bug *Armadillidium vulgare*. 20 individuals were placed in nine different environments for a fixed time and then walked through a paper maze facing five T-junctions, four times per individual. The nine environments consisted of eight different containers in combinations of two different shapes (cuboid, column), two different textures on the inner wall (rough, smooth), and two different colors on the inner wall (colorless and transparent, grayish white), and one environment without containers. The rate A that the pill bugs turned alternately left and right at all five T-junctions, out of 80 trials per environment, was examined. The results showed that the percentage of times A was (i) higher in the environment with containers than without containers, (ii) higher in cuboid than in column, and (iii) higher with grayish-white walls than with transparent and colorless walls, and (iv) higher with smooth walls than with rough walls. The percentage of A without a container was 52.50%, but with a smooth cuboid grayish-white container, the percentage of A was increased to 90.00%. Furthermore, by observation, we found that more individuals were not moving without a container than with one, and that walking in a column container puts strain on one side of the leg. These findings suggest that walking in the container affects the maintenance rate of turn alternation. Also, the maze used in these experiments was grayish-white and rough. So the change in environment was bigger when the individuals move into the maze from a transparent and colorless container or from a rough container. These big environmental changes may have affected the maintenance rate of turn alternation.

Keywords: **Armadillidium vulgare, Turn alternation, Maintenance rate**

The secret of a happy home, it is TV! ~Research its worth of existence from awareness survey intended for junior high school students and high school students~

Kanon Onishi, Hikaru Takeshita

Abstract

Recently, the number of people who use mobile devices has been increasing in Japan. In this society of Japan, what is the worth of TV? We researched it and what kind of TV production is being done to take advantage of the merits of TV. We conducted a series of surveys and interviews with Rakuhoku Junior High School students and High School students, and TV stations. As a result, we found that watching TV encourages family conversation. Also, it is important that viewers do not have the awkward mood by watching TV and that the programs are accepted by a lot of viewers. We discovered the characteristics of TV programs that people want to watch with their family. However, some of them are not recognized by TV stations. Through this research, we concluded that chances of communicating between viewers and TV stations are needed to promote family conversation by watching TV.

Keywords: **TV, received by everyone, family conversation, communication**

New breakthrough to reduce plastic waste

Syo Fuji, Maho Ito, Serina Wada

Abstract

In order to reduce the amount of plastic waste from a familiar perspective, we decided to reduce the amount of plastic-rich stationery, which is especially familiar to students, among the lost and found at Rakuhoku High School. For this purpose, we held a "stationery reuse event" in which stationery collected from Rakuhoku High School was displayed at a "lost-and-found" exhibition to look for the owners. Those whose owners could not be found were given back to the students. In each event, students were interviewed and surveyed on the spot about their awareness of lost stationery. From this survey, we found that 99% of the students answered "yes" to the question of whether they would like to see another reuse event, and 68% of the students answered because they were interested in attending the reuse event after reading the information in the survey. From the above, we conclude that holding a reuse event every year will help to reduce the amount of lost stationery and improve students' awareness of lost stationery.

Keywords: **Plastic waste, Lost and found stationery, Reuse event**

They may run out of food!?
Soy we should eat SOY MEAT
~Devise recipes for high school students to promote SOY MEAT~

Haruka Hasegawa, Meitoku Tadatomo, Shiuko Tsuji, Nari Yamashita

Abstract

The purpose of this research was to contribute to environmental issues by promoting soy meat, which has been attracting attention as a meat substitute in recent years, to high school students. We conducted a 9-item questionnaire survey to measure the level of recognition and understanding of soy meat, and based on the results, conducted interviews with companies that manufacture soy meat. Based on the information and experience gained during two rounds of interviews with seven questions, we devised and prototyped an optimal menu utilizing the advantages of soy meat. Then, based on the reflections from the results, we improved the recipe and served it in the school cafeteria. Afterwards, we conducted a survey on changes in awareness by means of a five-item questionnaire. As a result, we were able to change high school students' awareness of soy meat, leading to increased recognition of soy meat. As a future challenge, we would like to propose the use of this product for school lunches at elementary schools, taking advantage of the fact that it also provides an opportunity to think about environmental issues.

Keywords: **Soy Meat, recipe, High school, environment**

Change in sound insulation rate of perforated board

Hiroki Fujikawa, Akira Imai, Aki Kaneda, Tomoki Koizumi

Abstract

According to SHUEISHA inc., due to the COVID-19 pandemic, the number of noise problems by individual is increasing in Japan. Installation of perforated board, which is mainly installed in conference rooms or music rooms, is known as a means of sound insulation. So, we conducted an experiment in order to verify whether perforated board is suitable for sound insulation or not. A box with holes and a box without holes were stacked in a double layer, and sound was played from a speaker placed inside. The sound insulation rate was determined by measuring the volume of the sound with a smartphone placed outside the box and comparing it to the experiment using only the box without holes. According to Experiment 1, the sound insulation rate increased around the resonance frequency at 8 mm and 10mm. From Experiment 2, at 8mm and 10mm, the noise reduction phenomenon occurred in about half the range of the whole. In conclusion, we found that perforated board has frequencies that insulate and frequencies that are amplified by resonant transmission. Though it has limited sound insulation performance by using it only, further soundproofing can be expected when used with other sound-absorbing materials.

Keywords: **sound insulation rate, Helmholtz resonator, perforated board, LA-ICP-MS, tuff**

Pasta Bridge
~Relationship between length of one side and strength of truss structure~

Chisa Mizuhara, Ayuna Murakami, Chiharu Muramoto, Souma Takeuchi, Yuma Yamaji

Abstract

Preliminary experiments have shown that the strength of a single piece of pasta is inversely proportional to the length of that piece of pasta. Therefore, we verified whether the strength and length of a truss structure, which is a structure composed of equilateral triangles, are also inversely proportional. We used pasta of different lengths (6, 8, 10, 12, and 14 cm) and built bridges with truss structures and suspended weights until the bridge broke and examined the relationship between the load capacity and the length of one side of the bridge. As a result, the relationship between the load capacity and the length of one side of the pasta was close to inverse proportion. In other words, the relationship between the strength of truss structure and the length of one of its sides is almost inversely proportional. The truss structure is less capable of bending moment forces, which is factor of inverse proportion. This is why the strength of truss structure were not completely inversely proportional to the length of one of its sides.

Keywords: **Pasta Bridge, Truss structure, Inversely proportional, Bending moment**

Relationship between dominoes and angles

Fukuda Gakuto，Hoshiyama Takurou，Kawamoto Taiki，Kato Ryosei

Abstract

We studied the relationship between the angle of a domino and the speed of its fall. Previous studies have shown that dominoes fall fastest when the distance between the dominoes is 1.7 cm. They are demonstrated that when the angle of the dominoes was set to 30°, it takes about 1.9 times longer for all the dominoes to fall down than when they are arranged in a straight line. Therefore, we hypothesized that the larger the angle of the dominoes, the longer it takes for all the dominoes to fall. To reduce the variation of the initial velocity of the 40 dominoes, the time it took for all 35 dominoes except the first 5 to fall down was examined. In addition, we also experimented with an arrangement in which the dominoes were connected only at the part of the circle where the circle switches (we called this arrangement zigzag.).As a result, the time required for the dominoes to fall increases as the angle of the dominoes increases The time required for the dominoes to fall down was longer when they were arranged in a circle than when they were arranged in a zigzag pattern. When the dominoes were arranged in a circle with cellophane tape, the dominoes with no tape fell faster up to 15° than those with tape up to 20°, and the dominoes with tape fell faster above 25°. It was found that the position of the dominoes is important for how the dominoes fall. When the dominoes are arranged in a circle, the dominoes move in a different direction from the circle in which they are arranged as a result of the change in the position of the dominoes hitting the circle, which greatly affects the time it takes for the dominoes to fall.

Keywords: **Domino, Circle, Zigzag, Cellophane tape**

The change of "*Kokeshi* structure" due to the variation of droplet and fluid layer viscosity

Toya Hanaoka, Kairi Okura, Reo Sugimoto, Natsuki Yamamoto

Abstract

The milk crown phenomenon is a phenomenon that occurs when a droplet of milk is added to a volume of milk and a beautiful crown is formed. It is said that the viscosity of milk is an important factor in crown formation, but it is not known which is more dominant, the viscosity of the droplet or the fluid layer. Our group observed the shape of *Kokeshi*, which appears near the center after the milk crown is formed, by changing the viscosity of both the droplet and the fluid layer. We captured the formation of the milk crown by using a high-speed camera and measured the size and shape of *Kokeshi*. Not only was the droplet found to be dominant in the shape of the milk crown and the height of the *Kokeshi*, but also the viscosity of the droplet was found to play a significant role. The reason why the height of the *Kokeshi* increased as the viscosity increased may be because the mass of the droplet increased as the viscosity increased, and thus the momentum of the droplet increased. Glycerin has lower surface tension than water, and the vertical upward force to form a Kokeshi is less suppressed by the surface tension, so we conclude that the higher the viscosity of the droplet is, the higher the height of *Kokeshi* is.

Keywords: milk crown, Kokeshi, viscosity, surface tension

Dancing Mystery of Nature ~The Difference of Falling Speed Caused by Snow Crystal Structure~

Ayao Morino, Riko Otohata, Ema Sasaki, Yuki Tanigawa

Abstract

We were inspired by the snow which falls slowly and conducted this experiment using the structure of snow crystals in order to create a safer parachute. First, we various snowflake made the models with a 3D printer. Next, we dropped the models at 5.3 meters and did a time measurement in seconds to see how quickly they fell. We also did the experiment using wind tunnel equipment in order to observe the flow of the air. From these experiments, we found that the model “twelve branches” fell most slowly with 1.830 seconds and that the model “square plate” fell most stably with 1.826 seconds. The models that the air flow spread more for than the models’ diameter when the air flow hit the models in the wind tunnel equipment had a large air resistance, and it made the models fall more slowly. In addition, complex models caused turbulence that brought their falling to an unstable drop.

Keywords: snow crystals, parachute, 3-D printer, falling experiment, turbulence, spill hole

Resonance experiment with simple structures

Kousuke Hizume，Kai Miura, Yuta Tatsumi, Sogo Yamazaki

Abstract

Each object has a "natural frequency”. When an object is subjected to a vibration of this value, it will "resonate”. Resonance is when a vibrating object vibrates more intensely in synchronization with external vibrations, which is a threat to high-rise buildings. If the natural frequency of a building is low, it can easily resonate during a long-period earthquake, leading to collapse in the worst case. In order to verify the relationship between structures and their natural frequencies, we constructed eight simple structures with the same volume in various skeletons and subjected them to vibration experiments. As a result, we found that the structure closest to a rectangular body has the highest natural frequency and is the least likely to resonate.

Keywords: **Natural frequency, resonance, long-period earthquake, simple structure, rectangular body**

Research on Collatz Conjecture and related issues

Isoe Gentaro, Morikawa Kohei, Yoshifumi Masashige

Abstract

We studied the Collatz Conjecture because we were interested in n–adic numbers, and wanted to address an problem related to it. The Collatz Conjecture is the conjecture that for any natural number n, if n is even and divided by 2, and if n is odd and multiplied by 3 and 1 is added, you can repeat the operations to reach 1 after a finite number of operations. This is an unsolved problem advocated by the German mathematician Lothar Collatz. In this study, we were able to limit the scope of the Collatz Conjecture, which holds for any natural number. The division into cases also clarified the properties of the sequence of manipulated numbers and allowed us to narrow down the conditions. We also studied related issues but were unable to show a clear connection with the Collatz Conjecture, so this will be the subject of future work.

Keywords: **I.e. Lothar Collets Conjecture, etc.**

Isenshi Numbers' World
~A Study on the Median of Divisors~

Yusuke Muto, Yusuke Okumura, Naru Tanide

Abstract

We defined Isenshi Numbers and explored the natures of them. Isenshi Numbers fulfill the following two conditions. First, they are natural numbers except all square numbers. Second, the quotient of every Isenshi Number divided by the median of it is an integer. We performed this study in this way: we listed Isenshi Numbers up to 20,000,000, factorized them, and represented the factors in the form of the sum of two natural numbers. Finally, we revealed at least 5 theorems. First, the number of divisors of all Isenshi Numbers is even. Second, every Isenshi Number is even. Third, every Isenshi Number does not exist in an expression $3l+2$, where l is a natural number. Fourth, Isenshi Numbers exist infinitely. Fifth, the formula

$$N = (m+n)^2 mn \ \ (m < n)$$

represents an Isenshi Number when the following conditions are fulfilled. One of two natural numbers m, n is odd and the other is even. $m+n$ is a prime number which is 3 or more. Two natural numbers p, q ($mn=pq$ and $m<p<q<n$) do not exist.

Keywords: **Isenshi Number, median, divisor**

The Influence of Distracted Walking ~Relationship between human flow and visual field using FF model~

Haruki Fujimori, Haruto Isodono, Rikuto Matsubara

Abstract

We were interested in the thesis written by Dr. Murakami about between human flow and distracted walking, so we have researched the influence of distracted walking and this cause more deeply. Our experiment focused on "visual field", which is one of the changes caused by distracted walking. To conduct it, we used Python to reproduce the actual oncoming pedestrian flow with the floor field model. Experiments focusing only on the angle of view showed that the angle of view for the fastest completion of a normal pedestrian movement is 90 degrees. It was also found that there is a quadratic correlation between the viewing angle and the speed at which the movement is completed, with the viewing angle set at 90 degrees. Based on the results of this experiment, if we set the viewing angle of a normal pedestrian to 90 degrees and the viewing angle of a distracted pedestrian to 30 degrees, it was shown that the more distracted walking people there are, the slower the speed at which the movement is completed at the optimal viewing angle.

Keywords: **Distracted Walking, Floor Field Model, Python**