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From the Editor

International Journal of Electronics, Mechanical and Mechatronics Engineering (IJEMME), is an international multi-disciplinary journal dedicated to disseminate original, high-quality analytical and experimental research articles on Robotics, Mechanics, Electronics, Telecommunications, Control Systems, System Engineering, Biomedical and Renewable Energy Technologies. Contributions are expected to have relevance to an industry, an industrial process, or a device. Subject areas could be as narrow as a specific phenomenon or a device or as broad as a system.

The manuscripts to be published are selected after a peer review process carried out by our board of experts and scientists. Our aim is to establish a publication which will be abstracted and indexed in the Engineering Index (EI) and Science Citation Index (SCI) in the near future. The journal has a short processing period to encourage young scientists.

Prof. Dr. Hasan HEPERKAN
Editor

A New Triple Band Antenna Design for GPS/ WLAN/ WIMAX Applications

Ilkin IBRAHIMLI[1], Hemrah HIVEHCHI [1], Saeid KARAMZADEH[1.2]

ABSTRACT

Abstract- In this work, a novel CPW antenna for wireless communication is proposed. Three practical frequency bands are achieved by three rectangular slots on the patch and a pair of L-shaped slots and rectangular slots on the ground. The proposed antenna size is 30×25×0.8 mm^3. Simulated results show that the presented antenna can cover three separated impedance bandwidths of 600 MHz (1.2–1.8 GHz), 400 MHz (2.2–2.6 GHz), and 2000 MHz (4.5–6.5 GHz), which are well applied for WLAN, WIVAX and GPS applications.

Keywords: multiband antenna; CPW; GPS; WLAN; WIMAX

Introduction

Depending on the rapid progress in communications systems, there is an increasing demand of internal multiband antennas. Many of wireless communication applications like Wireless Local Area Network (WLAN) and Worldwide Interoperability for Microwave Access (WiMAX) technology are required to operate together for use in GPS and Wi-Fi and another protocols. Recently, several works have appeared regarding the development of multiband and low-profile antennas for many applications in addition to GPS, WLAN and WIMAX applications [16-21]. Literature review of multiband antenna design could be summarized as: coplanar waveguide-fed L-loaded printed Inverted-F antennas [1], shorting pins of the loop antenna [3], L- and U-shaped slots [4], such as using three simple circular-arc-shaped strips [5], Inverted-F strips, S-shaped and a meandered strip [8], defected ground structure (DGS) and dual inverted L-shaped strips [9] and complementary split-ring resonator [10]. Besides, global positioning system (GPS) band is a critical operating frequency band that should be supported by internal multiband antennas of mobile devices. However, the polarization of the GPS antennas are so important parameters too [2,6]. However, for a GPS (1570–1580 MHz) receiver linearly polarized antennas can be also used [7,11]. In addition, covering both WiMAX and WLAN frequency bands in present of GPS frequency band is the biggest challenge for researchers [2–11]. In this work, a novel compact size multiband antenna for covering the GPS band (1.5 GHz), WLAN band (2.4 GHz) WiMAX band (5.5 GHz), has been proposed. Designing steps for getting all required bands will be proposed one by one.

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1. Antenna Design

In this section four steps have been followed for obtaining the multiband antenna. Simulation results for each step were analyzed. For designs and finding the improved parameters, Ansoft high frequency structure simulator software (HFSS, ver.16) was used. The proposed antenna is designed on a low cost and low profile FR4 substrate material with 0.8 mm thickness. Figure 1 shows the antenna designing steps. Ant. 1 includes only a feed line connected to rectangular plane and ground plane where just two resonances in 1.2 - 2.45 and 4.7 – 7 is achieved;

Ant. 2 includes rectangular slots, after creating the slots on the patch we could obtain three resonances (1.15-175, 2.2-2.4 and 3.5-5.85) improved. In Ant. 3 by cutting top of the ground and creating two L shape slots, we tried to more resonance and fine response but we achieved these frequencies 1.2-1.78 2.2 2.4 4.2-5.78. In Ant. 4 and final design creating two rectangular slots on the down of the patch, we achieved good results and obtained three resonances in 1.5, 2.4 and 5.5 GHz, as shown in figure 2.

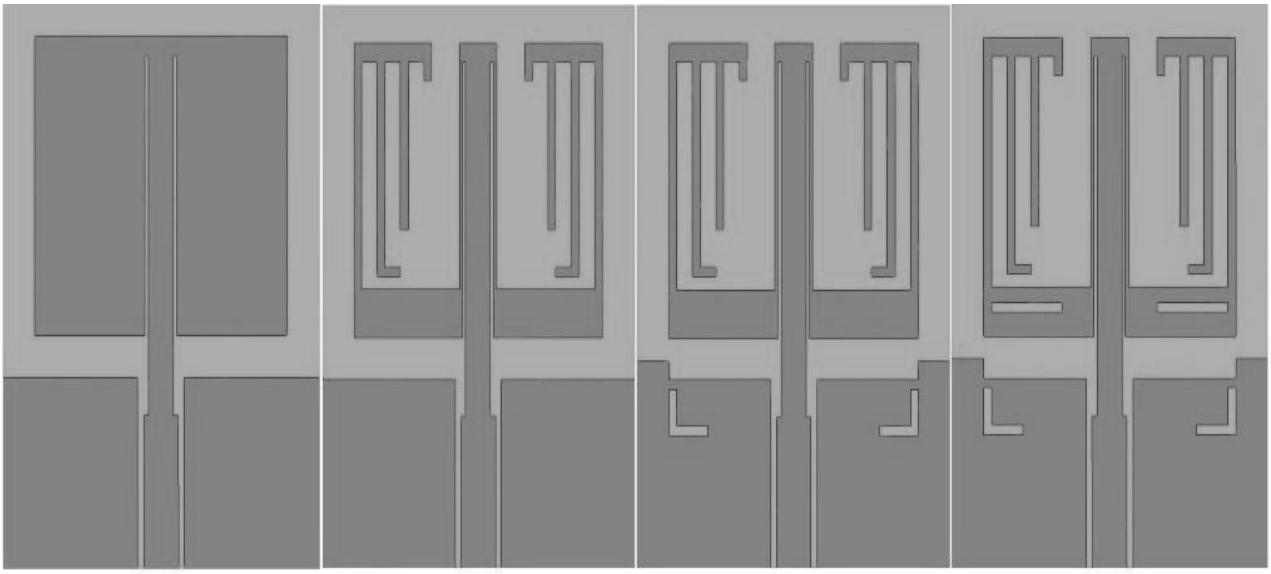


Figure 1: Four improved prototypes of the proposed antenna

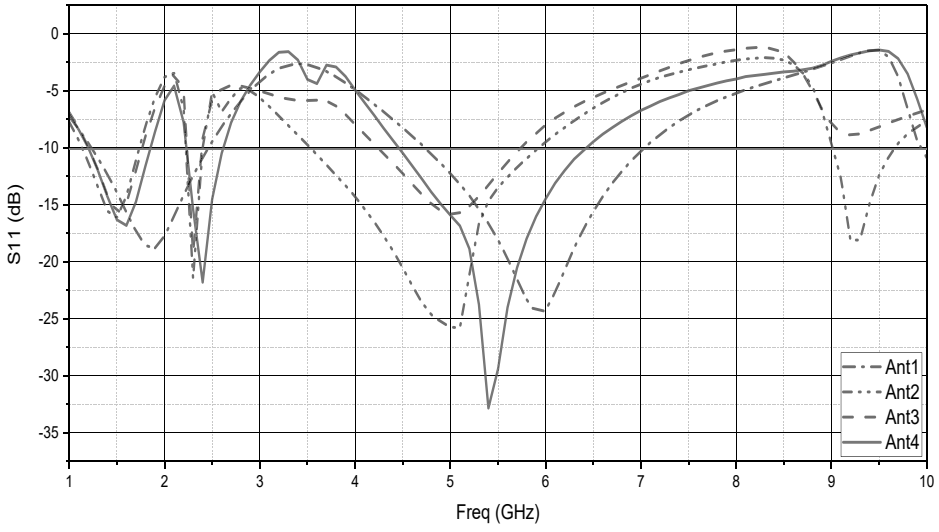


Figure 2: Simulated S11 for antennas (1-4)

1.1 RESULTS AND DISCUSSION

Figure 3 shows the geometry of the proposed multiband antenna. For simplification in the antenna design SH1 30.0 mm, SW1 20 mm, h = 0.8 mm were already selected. The rectangular radiating patch has been cut by rectangular slots and a pair of L-shaped slots in the ground. The impedance matching is improved by the tapered 50 Ω CPW feeding line. Dimensions of rectangular slots and L-shaped slots, has been adjusted for creating the three different resonant frequencies. The final dimensions of the proposed antenna are as follows (all dimensions are in millimeters): SW1 20, SW2 0.2, SW3 2.0, SW4 0.7, SW5 0.4, SW6 1.0, SW7 1.0, SW8 0.5, SW9 2.5, SW10 4.5, SH1 30.0, SH2 2.0, SH3 0.5, PH1 1.0, PH2 15.8, PH3 8.0, PH4 1.0, PH5 2.0, PH6 9.0, PH7 11.0, PH8 1.3,PH9 12.2, PW1 1.6, PW2 7.0, PW3 2.2, PW4 0.5, PW5 0.5, GH1 10.0, GH2 0.5, GH3 1.0, GH4 3.0,GH5 10.0, GW1 8.5, GW2 2.0.

According to the figure 4 (Reflection Coefficient (S_{11}) and Voltage standing Wave Ratio (VSWR)) three different bands are achieved successfully. 3-D and 2-D radiation patterns of the three resonances (1.5 GHz, 2.4GHz and 5.5 GHz) are shown in figure 5 and figure 6 respectively.

Proposed antenna compared with the characteristics of some antennas is shown in table 1.

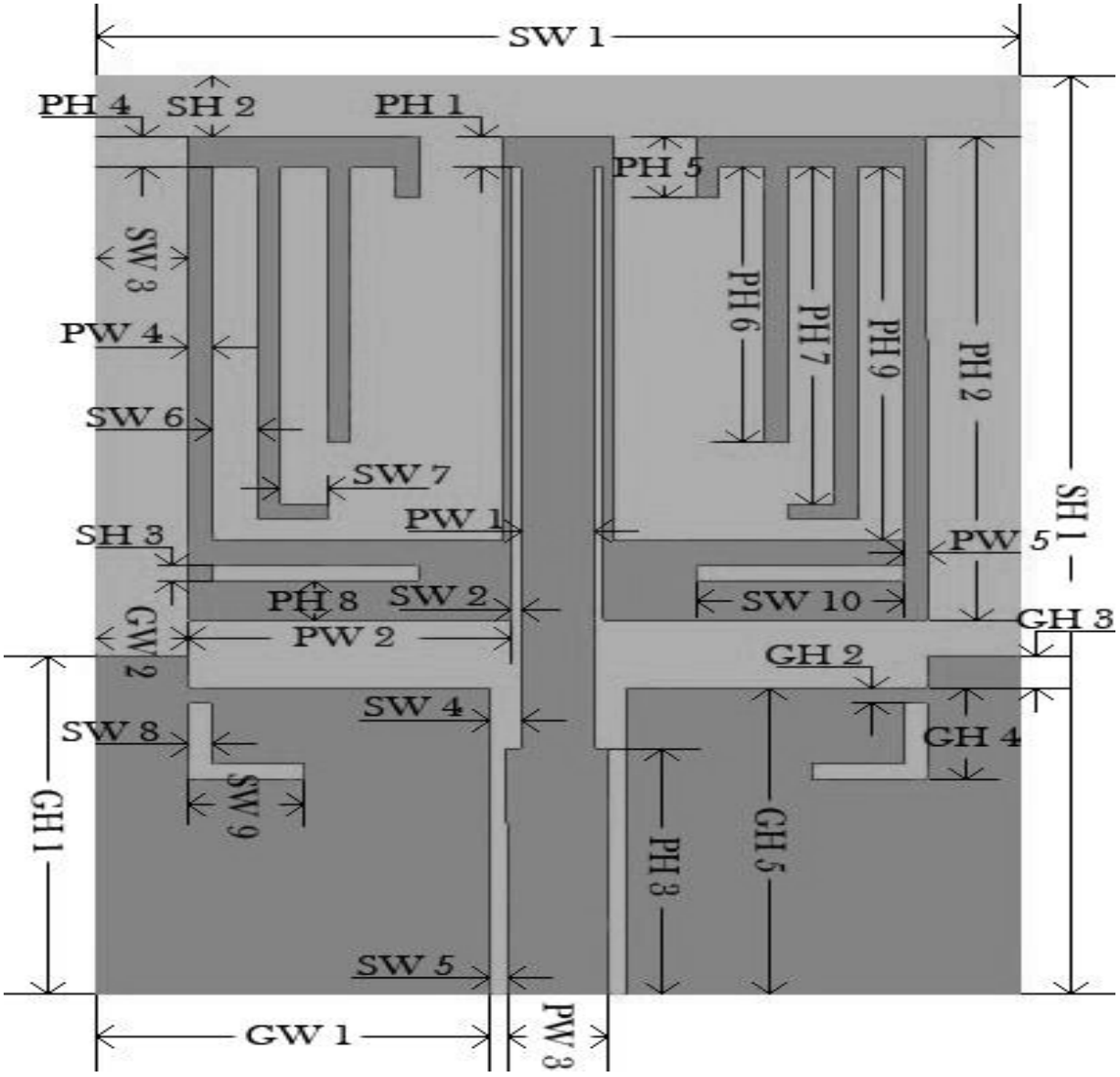
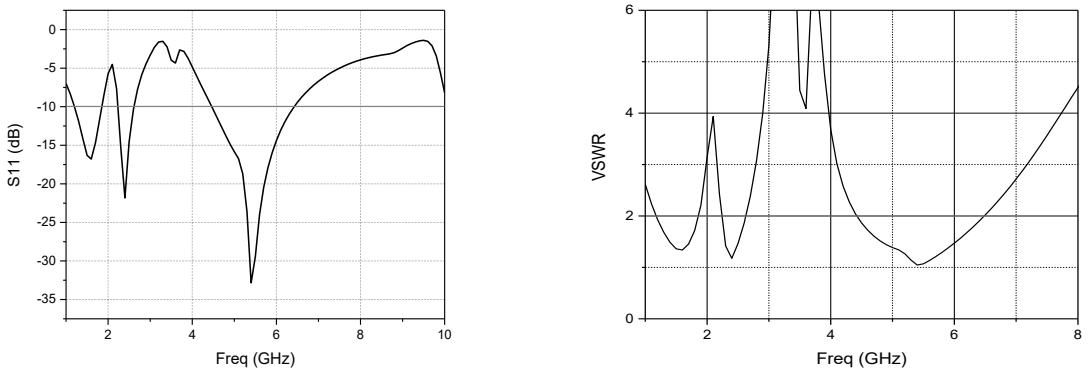


Figure 3: Geometry of the proposed antenna.

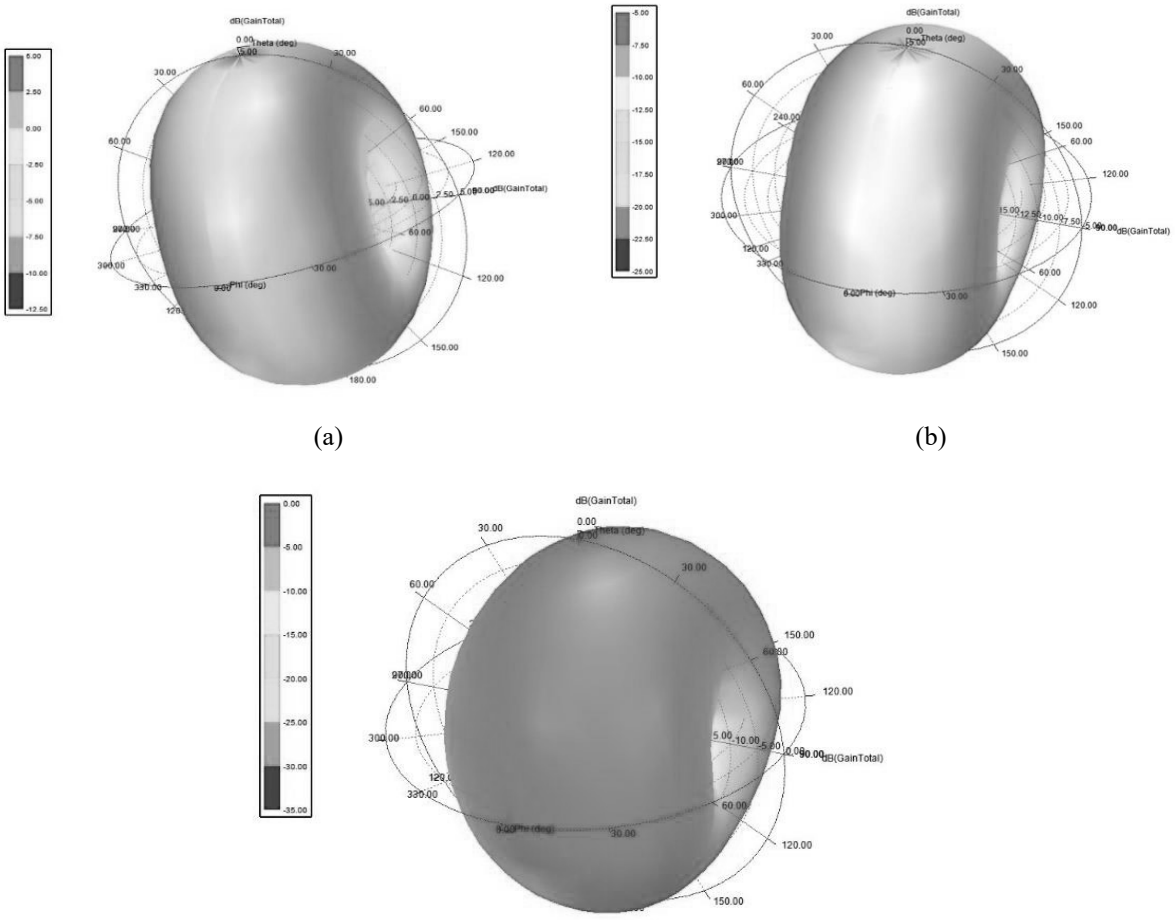
Table 1. Comparison of the simulated characteristics of some antennas with the proposed work

REF	SIZE (mm^3)	GPS	WLAN	WIMAX
12	30×25×1.6	-	2.4	-
13	23 ×36.5×0.8	-	2.4	3.5
14	50×30×1.6	-	2.4	-
15	25×30×1.6	-	-	5.5
Proposed antenna	30×20×0.8	1.5	2.4	5.5



(a) (b)

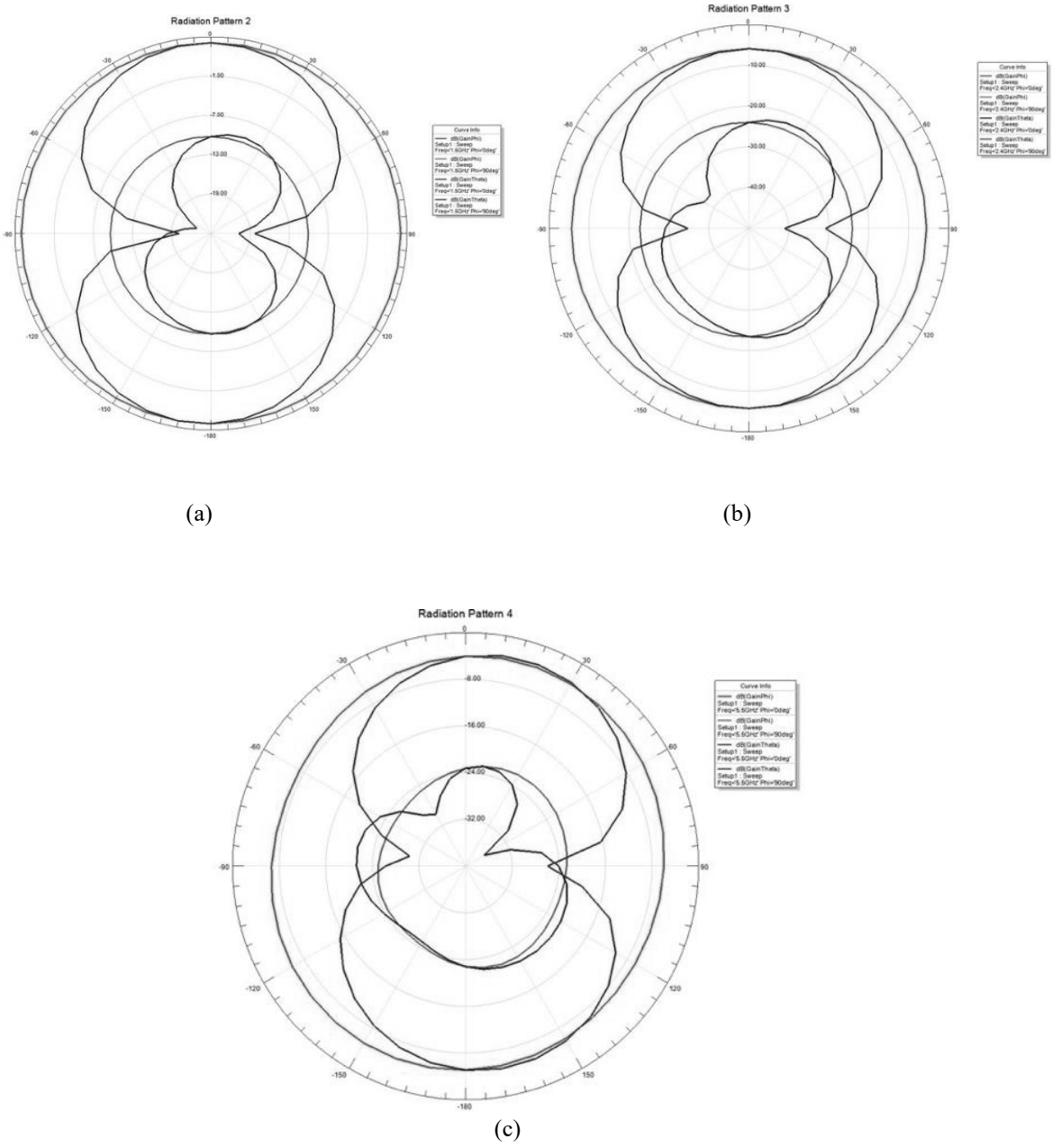
Figure 4: Simulated (a) S11 and (b) VSWR for the proposed antenna



(a) (b)

(c)

Figure 5: 3D radiation pattern in proposed antenna (a) 1.5 GHz, (b) 2.4 GHZ and (c) 5.5 GHz



(a) (b)

(c)

Figure 6: Simulated radiation patterns at 0 and 90 degrees (a) 1.5 GHz, (b) 2.4 GHz and (c) 5.5GHz

2. Conclusion

In this paper, a new multiband antenna is proposed for GPS, WLAN, and WiMAX applications. In the presented antenna, rectangular slots on the patch and L-shaped slot on the ground are used for getting multiband frequency ranges. Radiation performance of the antenna is acceptable too. In addition to the multiband frequencies, the compact planar size structure, low cost and easy fabrication are other advantages of the proposed antenna.

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Requirements Of Knowledge Management Implementation In Istanbul Aydin University

Fady M. F. ABUGHAZI[1], Uğur ŞENER[2]

ABSTRACT

Knowledge is power. After knowledge has started to play an important role in organizations, this paper comes to prove the importance of knowledge management in the education sector. The study aims to explore the requirements of knowledge management implementation in Istanbul Aydin University in Turkey. The descriptive analytical approach is used, and the population of the study was the staff working in Istanbul Aydin University. The questionnaire was used as a tool for data collection. The collection of data was done by sending an online questionnaire to staff emails and distributing the questionnaires to the university's staff by hand. 281 questionnaires were collected and analyzed statistically by SPSS program. The main conclusions of the study are that knowledge management assists Istanbul Aydin University to achieve their goals and that there is a positive relationship between the implementation of knowledge management and the requirements of knowledge management (organizational structure, leadership, information technology) in Istanbul Aydin University.

Keywords: KM, Knowledge management, requirements of KM, KM implementation

ÖZ

Bu çalışma İstanbul Aydın Üniversitesinde bilgi yönetimi uygulamalarını araştırmaktadır. Araştırmacı betimsel analitik yaklaşımı kullanmış ve araştırmanın popülasyonunu İstanbul Aydın Üniversitesindeki akademik personel ve idari personel oluşturmuştur. Anket veri toplama aracı olarak kullanılmıştır. Veri toplama işlemi iki yoldan tamamlanmıştır. İlk olarak, araştırmacı bir çevrimiçi anket tasarlamış ve üniversitenin e-postaları tarafından çalışan personele gönderilmiştir ve (30) çalışan personel çevrimiçi ankete cevap vermiştir. Araştırmacı, üniversitenin personeline anket formları dağıtılmıştır. (290) (%86.5) oranında (251) anket formu toplanmıştır. Araştırmanın sonuçlarına göre; bilgi yönetimi İstanbul Aydın Üniversitesi'nin hedeflerine ulaşmasına yardımcı oluyor ve bilgi yönetiminin uygulanması ile bilgi yönetimi gereklilikleri arasında (örgüt yapısı, liderlik bilgi teknolojisi) olumlu bir ilişki var.

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Sonuçlar, İstanbul Aydın Üniversitesi'ndeki bilgi yönetimi (organizasyonel yapı, dönüşümsel liderlik ve bilgi teknolojisi) gereklilikleri arasında olumlu ilişkiyi göstermiştir. Bilgi teknolojisi (3.83) ortalama ile birinci sırada yer alırken, bunu (3.34) ortalama ile örgütsel yapı izlemiştir. Liderlik (3.10) ortalama ile üçüncü sıradadır. Bilgi Yönetimi ve organizasyon yapısı alanlarının uygulanmasında, katılımcıların, pozisyon nedeniyle bilgi yönetiminin uygulanması gereksinimleri ile ilgili olarak anlamlı istatistiksel farklılıkları olduğu tespit edilmiştir. Ayrıca, liderlik ve bilgi teknolojisi alanlarındaki konuma bağlı olarak yanıtlarda anlamlı istatistiksel farklılıkların olmadığı ve aynı zamanda cinsiyet ve yaş tecrübelerinden dolayı yanıtlarda önemli istatistiksel farklılıkların bulunmadığı ortaya konulmuştur.

Bu araştırma, üniversitenin bilgi yönetimi alanında bir dizi seminer, konferans, atölye çalışması eğitim kursu ve konferans düzenlemeye dikkat edilmesi ve bilgi yönetimi bilgi paylaşım kültürü kazandırması gibi tavsiyelerde bulunmaktadır. İstanbul Aydın Üniversitesi, Bilgi yönetiminde yaratıcılık süreçleri geliştirmeyi, yeni yaratıcı fırsatları izleyerek ve bunlardan en iyisini seçerek değerlendirmelidir. Ayrıca, bilgi yönetimi faaliyetleri çalışanlar arasındaki rekabet için bir temel oluşturmalıdır.

Introduction

Knowledge is progressively being acknowledged as the new imperative strategy for organizations, and the capability to manage knowledge is becoming progressively more critical in today's knowledge economy. The creation and propagation of knowledge have become increasingly significant factors in competitiveness. The emergence of the Knowledge Management (KM) definition started with Peter Drucker's famous quote (1993): "The basic economic resource is no longer natural resources, nor labor, nor capital. It is and will be knowledge".

KM as an organizational innovation has been with us for more than a decade. As a discipline, it has reached a state of maturity where we can now discern the principles, practices, and tools that make it unique. As a discourse, it has engendered new concepts and categories for us to make sense of the many important ways that organizations use knowledge to create value (Dalkir, 2005).Thomas H. Davenport defined KM as "the process of capturing, distributing, and effectively using knowledge." KM is becoming increasingly important and effective in various sectors of society.

Knowledge sharing is considered the most significant resource for assuring a continuous survival, existence and success for the organizations. This study explains and discusses the most important subjects that help the success of KM implementation. This study tries to answer the question which is "what are the requirements for the organizations to be successful in KM implementation" through studying the three diminutions that affect the implementation of KM which are "organizational culture, leadership and information technology".

1. LITERATURE REVIEW

In this part, previous studies about knowledge management, organizational structure, transformational leadership and informational technology is presented.

1.1 Knowledge Management

Everyone manages. Managing our time, career, finance, relationship and life are considered as managerial behaviors. However, the complexity increases when the concepts of managing or being a manager are applied to an organization (Darr, 2010). The practice of management can be traced to the twentieth century, in spite of the importance of management in all business and humanitarian activities, however there is no clear agreement among experts and researchers in the field of management on the standard definition.

The definition of KM concept varies according to the changing of the entrances of the concept as well as the changes of the disciplines and the backgrounds of researchers and writers in this field. This contrast is also due to the breadth of KM concept or the rapid changes of the concept. KM can be defined as the exploitation of skills and expertise to facilitate the generation and sharing of knowledge among the members of the organization through group working and seeking for the necessary information to achieve the objectives of the organization.

There are so many features for the organizations that operate the concept of KM. Organizations of KM use the scientific research methods and other systemic methods as a basis for planning, thinking and decision-making. And also, they seek to ensure the development of knowledge from various internal and external sources, and the continuous updating of the available knowledge. They also use the current available knowledge appropriately in setting goals and objectives in addition to the high-speed rate of processes of creativity, innovation and the development of products and services.

1.2 Organizational Structure

The most appropriate organizational structures for the implementation of KM in organizations are structures that help to develop the spirit of teamwork that is characterized by flexibility, and continuity and sharing of knowledge at all levels of the organization.

KM can be successfully implemented by an organization when they know their needed knowledge. Even though, some of the best practices of KM can be transferred among organizations, internal and external situation of the organization should be taken seriously and KM activities should be adjusted to it (Mládková, 2011).

The type of organizational structure is a critical factor that influences the success of the organization with any KM activities. Nonaka and Takeuchi (1995) classified three types of organizational structures, and these structures are; the bottom-up structures, top-down structures and combined structures (Mládková, 2011).The best structure which helps the implementation of KM is the combined structure because it is a hybrid structure, thus organizations can use the benefits of the advantages of bottom-up and top-down structures and crush the disadvantages.

1.3 **Transformational Leadership**

Leaders are strongly effective in the practices of KM. What leaders could do for making this factor more effective is to share their individual knowledge and also to fulfill and promote their knowledge skills (Gelard & Boroumand, 2014). Transformational leadership ables to function such an important role in promoting the environment of organizations and it can help to apply knowledge efficiently by managing the knowledge in the desired way to improve the organizational learning (Aragón-Correa, J. A., García-Morales, V. J., & Cordón-Pozo, 2007).

All of the transformational leaders have the same common attribute that all of them try and attempt to encourage their followers to involve a higher degree of KM (Bryant, 2003). Transformational leaders improve an environment which aids to create, share, maintain, and imply knowledge. Especially, transformational leaders by using advantages of the mental inspiration, ideal and developmental support to inspire their followers to generate and share knowledge.

Podsakoff, Mackenzie, and Bommer (1996) declared that transformational leaders generate and invent original ideas and support the workers in applying these ideas to develop the process of production. According to this, it has been noticed that there is a positive relationship between transformational leadership and the employees' performance. Eventually, organizations encourage innovative performance among the employees to support knowledge creation (Birasnav & Rangnekar, 2011).

In general, KM's behaviors can be predicted by transformational leaders, and they function a very significant role in implying and managing KM. Those leaders show the same view and generate functional solutions to inspire the followers to make them more taking a part in the activities of KM. Transformational leaders prepare lower- level individuals with information competencies, motivation, skills and duties that assist them to inspire, gain, create, share, keep and imply knowledge.

1.4 **Information Technology**

Prusak and Davenport (1998), the core role of IT in KM is to quicken the rapidity of transferring knowledge. The software of KM advocates the flow of knowledge through communities and networks. The tools of KM aim to help the practices of organizing and gathering the knowledge of groups of individuals to make the knowledge obtainable in a shared base. The use of modern information technology to get the best results is the main requirement for organizations that want to be at the forefront. KM needs to apply IT in order to improve creating, organizing, sharing and applying knowledge. Therefore, these technological tools are too important and without them the organizations cannot apply and practice the KM to the fullest. IT is playing an important role in easing the implementing of KM in organizations.

Today, numerous tools are available under the umbrella of KM. The discovery of knowledge by technological tools makes it very effective for those organizations that want to get a sustainable competitive advantage. Technology plays an important role in the management of knowledge, as in knowledge generation, acquisition, sharing and storing. Thus the role of technology in KM can be summed up with the following points:

- KM is often facilitated by information technology.
- Supports the interaction of resources for the generation of new knowledge.
- Increases the “capability” and “efficiency” of KM by IT tools.
- Provides solutions for KM.
- Provides several means to facilitate the formation of joint workshops.

2. METHODOLOGY

A descriptive study, in addition to a statistical analysis, is used to describe and evaluate the requirements of KM implementation in the IAU. A questionnaire was used to test and analyze the requirements of KM implementation. The study represents a population of working staff including deans, administration staffs, head of departments and academics in IAU, however, 30 of working staff members answered the online questionnaire and 251 collected questionnaire by hand and the number of the collected questionnaires was 281.

A Likert scale was used to measure respondents' responses to the questions of the questionnaire. The questionnaire was composed of two parts: first part was aimed at collecting personal and professional information including, gender, job title and years of work. Second part was aimed at measuring the implementation of KM and the requirements of KM implementation (organizational structure, transformational leadership and information technology).

Kolmogorov-Smirnov test was used to make sure if the collected data was distributed according to a normal distribution or not. The next table shows the result of the test.

Table 2.1 One Sample Kolmogorov-Smirnov Test

Field	P-value (sig.)
All Fields of the Questionnaire	0.0826

A Pearson correlation coefficient test was used to the internal and structure scale of the questionnaire. The results of the internal scale show the positive relationship between each element of the questionnaire and all elements of entire fields. Table (2.2) shows the lowest and the highest values of correlation for the elements of each field.

Table 2.2 The correlation coefficient (internal scale)

The field name	No.	Item (question)	Pearson correlation coefficient	P-value (sig.)
Knowledge management	1	Administrative behaviors such as (Knowledge appreciation, knowledge building, knowledge sharing) represent a model for workers in the university.	.564**	.000
	2	The University provides a continuous updating of the information by communicating with the external environment.	.768**	.000
Organizational structure	1	Decentralization of work provides an opportunity to share knowledge among employees.	.630**	.000
	2	The university provides a periodic review of the organizational structures according to the internal and external variables that are required by the effective organizational structure.	.804**	.000
Leadership	1	Managers have the ability to influence subordinates.	.592**	.000
	2	The University encourages the employees to submit their ideas and suggestions.	.821**	.000
Information technology	1	The University provides electronic facilities that supports holding conferences and meetings and transfer experiments remotely.	.563**	.000
	2	The University provides the necessary computer software for gaining and easily sharing the knowledge.	.740**	.000

Also, table (2.3) shows structure validity results which are the coefficient relation between each field of the questionnaire and the whole fields.

Table 2.3 The correlation coefficient between each field of the questionnaire and the whole fields

No.	The name of the field	Pearson correlation coefficient	P-value (sig.)
1	Implementation of knowledge management	.883**	.000
2	Organizational structure	.888**	.000
3	Transformational leadership	.906**	.000
4	Information technology	.712**	.000
5	Requirements of knowledge management	.982**	.000

In addition, in the table (2.4) a Cronbach's Alpha test was used to measure the reliability of the questionnaire and the results show a good and mostly a very high consistency.

Table 2.4 Cronbach's Alpha for Reliability

No.	The name of the field	No. of Items	Cronbach's Alpha coefficient
1	Knowledge management	13	.893
2	Organizational structure	11	.914
3	Leadership	11	.902
4	Information technology	10	.857
5	Requirements of knowledge management	32	.945
6	All fields of the questionnaire	45	.958

3. RESULTS

A Statistical analysis of the collected data from the questionnaire by using a statistical software program (SPSS) was performed to reach the results of the study that will be presented and analyzed.

One-Sample T-test was used to determine the statistical mean of each question and then compare the results with the neutrality degree of (3) and at the end conclude if the response to a questionnaire's item was equal to the neutrality degree of 3 or significantly differ from it.

Table 3.1 One-Sample T test mean and P-value (sig.) of the implementation KM field

Item's No.	Item (question)	Mean	P-value (sig.)	Test Value (T)	Order
2	Knowledge management helps in achieving the objectives of the university.	4.1281	.000	21.868	1
13	The University seeks to attract highly skilled and qualified people from outside to help in generating knowledge.	3.3630	.000	5.072	13
All the items of the field		3.7473	.000	19.218	

Table 3.1 shows the result of one sample T test for KM implementation field. The second question of the field placed as the highest accepted question and thirteenth question placed as the lowest accepted question. However, the results of all the items of the field show a general acceptance for the field of KM implementation.

Table 3.2 One-Sample T test mean and P-value (sig.) of dominant organizational structure field.

Item's No.	Item (question)	Mean	P-value (sig.)	Test Value (T)	Order
4	The University provides an organizational structure achieves integration, coordination and interaction in cognitive assets.	3.5943	.000	10.075	1
6	The university reduced the hierarchical levels of supervision to allow closeness between organizational levels.	2.8185	.008	-2.669	11
All the items of the field		3.3381	.000	6.970	

Table 3.2 shows the result of one sample T test for the organizational structure filed. The fourth question of the field placed as the highest accepted question and sixth question placed as the lowest accepted question. However, the results of all the items of the field show a general acceptance for the field of the organizational structure.

And also, table 3.3 shows the result of one sample T test of the leadership field. The sixth question of the field placed as the highest accepted question and eighth question placed as the lowest accepted question. In contrast, the results show that the sample didn't agree on some questions of this field, and we can see that there is a higher disagreement on the seventh question with a p-value of .365 which is way over than the level of significance, .05. However, the results of all the items of the field show a general acceptance for the field of leadership.

Table 3.3 One-Sample T test mean and P-value (sig.) of dominant transformational leadership Field

Item's No.	Item (question)	Mean	P-value (sig.)	Test Value (T)	Order
6	The University participates in local and international scientific conferences which contribute acquiring a new knowledge.	3.6762	.000	10.815	1
7	The university relies on a leadership style which is based on granting authority to employees.	3.0641	.365	.907	8
8	There is justice in the distribution of rewards and bonuses among employees in the university.	2.4057	.000	-8.532	11
All the items of the field		3.1016	.037	2.092	

Table 3.4 shows the result of one sample T test for the information technology field. The third question of the field placed as a highest accepted question and sixth question placed as the lowest accepted question. However, the results of all the items of the field show a general acceptance for the field of information technology.

Table 3.4 One-Sample T test mean and P-value (sig.) of dominant information technology field

Item's No.	Item (question)	Mean	P-value (sig.)	Test Value (T)	Order
3	Mainstreaming of the internet connection service for employees at all levels in the university.	4.2420	.000	24.913	1
6	The University provides electronic facilities that supports holding conferences and meetings and transfer experiments remotely.	3.6228	.000	10.402	10
All the items of the field		3.8317	.000	21.460	

Table 3.5 shows the correlation coefficient between KM and the requirements of KM equals .779** and the p-value (sig.) equals 0.000 which is less than ($\alpha = 0.05$). This result confirms a positive and statistical significance between the requirements of KM and the implementation of KM in IAU.

Table 3.5 The correlation coefficient between KM and KM requirements

Fıeld	Pearson correlation coefficient	P-value (sig.)
Organizational structure	.764**	.000
Transformational leadership	.683**	.000
Information technology	.531**	.000
Requirements of KM	.779**	.000

Table 3.6 Two independent samples T-Test for testing the differences due to gender

Field	Gender	No. of respondents	mean	Std Deviation	T-value	P-value (sig.)
KM implementation	Male	127	3.6996	.63480	-1.121	.263
	Female	154	3.7867	.66507		
Organizational structure	Male	127	3.3658	.75415	.525	.600
	Female	154	3.3152	.86051		
Transformational leadership	Male	127	3.1167	.82050	.281	.779
	Female	154	3.0891	.81109		
Information technology	Male	127	3.7929	.68071	-.900	.369
	Female	154	3.8636	.62328		
Requirements of KM	Male	127	3.4136	.66107	.060	.952
	Female	154	3.4089	.65795		

The results of Table 3.6 purely show that opinions regarding gender make no difference in the study. The results indicate to accept the sub-hypothesis which indicates that there are no differences among the respondents in their opinions over the study fields attributed to gender.

The results of Table 3.7 show that there are statistically significant differences among the respondents on the implementation of KM and organizational structure fields due to the job title variable. And also it shows that there are no statistically significant differences among the respondents on transformational leadership, information technology and requirements of KM fields due to the job title variable.

Table 3.7 Analysis of variance (Job-title variable)

Fields		Sum of Squares	df	Mean Square	*F*-statistic	Sig.
The implementation of Knowledge Management	Between Groups	4.538	4	1.135	2.736	0.029
	Within Groups	114.439	276	0.415		
	Total	118.978	280			
Organizational structure	Between Groups	11.616	4	2.904	4.619	0.001
	Within Groups	173.514	276	0.629		
	Total	185.130	280			
Transformational leadership	Between Groups	5.113	4	1.278	1.956	0.102
	Within Groups	180.417	276	0.654		
	Total	185.530	280			
Information technology	Between Groups	0.931	4	0.233	0.548	0.701
	Within Groups	117.237	276	0.425		
	Total	118.168	280			
Requirements of knowledge management	Between Groups	3.228	4	0.807	1.886	0.113
	Within Groups	118.071	276	0.428		
	Total	121.299	280			

Table 3.8 The analysis of variance (Experience variable)

Fields		Sum of Squares	df	Mean Square	*F*-statistic	Sig.
The implementation of knowledge management	Between Groups	.575	3	.192	.448	.719
	Within Groups	118.403	277	.427		
	Total	118.978	280			
Organizational structure	Between Groups	1.375	3	.458	.691	.558
	Within Groups	183.755	277	.663		
	Total	185.130	280			
Transformational leadership	Between Groups	2.353	3	.784	1.186	.315
	Within Groups	183.177	277	.661		
	Total	185.530	280			
Information technology	Between Groups	1.214	3	.405	.958	.413
	Within Groups	116.955	277	.422		
	Total	118.168	280			
Requirements of knowledge management	Between Groups	1.374	3	.458	1.058	.367
	Within Groups	119.925	277	.433		
	Total	121.299	280			

It can be concluded from Table 3.8 that there are no statistically significant differences among the respondents on these fields due to the experience variable.

4. CONCLUSION

The results show the positive relationship between the requirements of KM (organizational structure, transformational leadership and information technology) and the implementation of KM in IAU. In addition, the study identifies that there are no differences among the respondents in their opinions over the requirements of KM implementation attributed to gender and years of experience. The study detected that there are significant statistical differences in the implementation of knowledge management and organizational structure fields between the answers of the respondents concerning the requirements of implementing knowledge management due to the position (job-title). The study also detected that there are no significant statistical differences in the respondents' opinions in the transformational leadership, information technology and requirements of KM fields due to position (job-title).

5. RECOMMENDATIONS

The university should pay attention to hold a series of seminars, lectures, workshops, training courses and conferences in the field of KM in order to raise awareness, create a culture of KM and enable the exchange of information and experiences in this field. The university also should hold workshops to explain to the employees their rights in this respect and give them information about its regulations and laws. And also, they should make the practice of KM activities a basis for the competition among employees.

Next, the University should encourage its employees to share their ideas and suggestions by interacting with them and rewarding them for their significant ideas. The university should keep up with the management methods, methodologies and practices that are related to KM to improve, develop and invest the knowledge which is available in its human resources and pay attention to their knowledge as a great wealth that increases its success or turns its failure into success.

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Numerical Investigation Of Heat Transfer In A Cold Plate With Two Different Inlet Location

Mahdi TABATABAEI MALAZI[1], Suha SENSOY[2], Hasan Alpay HEPERKAN[1]

ABSTRACT

We need a uniform temperature distribution for obtaining higher performances from electronic devices. For cooling, mini-channel cold plates with coolant flow use electronic devices such as Li-ion battery cells and electronic chips. In this study, two different inlet locations were studied for the thermal management of a plate with constant heat generation. A commercial computational fluid dynamic software (Ansys-Fluent) was used for the simulation of Mini-channel cold plates with coolant flow and thus pressure drop, temperature and velocity distribution were investigated numerically. The effect of inlet location on heat transfer and temperature distribution was studied for laminar flow at two different Reynolds number (Re=500 and Re=1000). Water was used for the coolant flow of the cooling system. The numerical results show that changing inlet location causes temperature distribution to change at the same number of coolant channels in a cold plate.

Keywords: Heat transfer, Cooling plate, Coolant flow channel, Reynolds number

Introduction

The efficiency of electronic devices will be higher when the temperature of electronic devices are kept below the recommended temperature. A cooling system is important for getting optimum performance from electronic devices. The heat transfer capacity of PEMFCs type fuel cells are studied to determine the efficiency of multi pass serpentine flow field (MPSFF). Applying parallel multiphase serpentine flow brings more advantage than general type parallel serpentine in terms of uniform temperature distribution. On the contrary, this two serpentine types come up with a similar result in regard to pressure drop [1]. The geometrical impact of a channel that varies such as triangular, circular and square, is examined regarding to heat transfer coefficients that depend on mass flux and average quality [2]. Comparison between multiple parallel-pass (MPP) micro channel which provides an adjustable flow rate and conventional parallel tube condenser applied for increasing condensation field and heat transfer efficiency by using two phase flows [3]. It is investigated that the characteristics of serpentine shaped cooling channel is recorded by using CFD in variety of plate geometry related to the width, length and route of the channel. In this study, the optimization converge which is restricted with the objective function of pressure gradient and temperature uniformity

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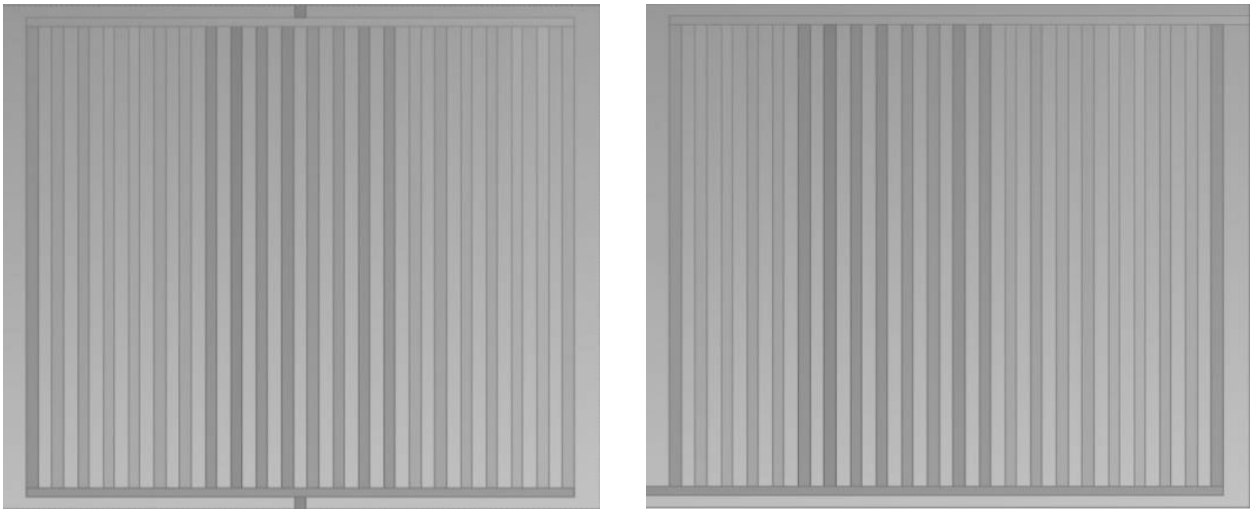
is performed by a different serpentine channel scheme variation [4]. Mini channel embedded to lithium-ion battery is used to operate optimum temperature with the different discharge rates. The study is examined with both experimental and computational methods [5]. Three types of mini-channel exchangers including a parallel, tree shaped and hybrid constructed, are examined in terms of thermodynamic properties. Besides, tree type design data were obtained majorly with numerical and experimental methods [6]. They give solution advice for the aim of cooling an electronic device with a micro-channels heat exchanger. Various Reynolds numbers and heat fluxes are being studied in order to get optimum value and channel types [7]. The changing of the numbers of the mini-channel heat exchanger is studied in terms of heat transfer from plane with natural convection. While providing fixed operating temperature on a physical domain, the experiment is resulted with the flow rate and flow direction effect being in an inverse correlation [8].

In this study, we studied two different models; Model A and Model B, at two various Reynolds numbers for plate constant heat flux. The results of temperature distribution and the average temperature of outlet were obtained in this numerical solution.

MODEL AND NUMERICAL METHOD

Two different cooling plate models (Model A and Model B) with infixed rectangular cooling channels were studied, as shown in Figure 1. The number of coolant channels and distance between coolant channels are the same in Model A and Model B but the inlet location is different in these models (Model A and B have twenty-two parallel channels with 0.5cm distance between channels). The dimensions of cooling plate models are 212mm x 212mm x 10mm (Length x Width x Height) and the dimensions of channels are 4mm x 4mm, as shown in Figure 2. Aluminum for cold plate and water for coolant fluid are used for this cooling system. Velocity inlet, pressure outlet, adiabatic surfaces and a constant heat flux surface were applied for boundary condition in this study (Figure 3).



(Model A) (Model B)

Figure 1. Geometry of Model A and Model B.

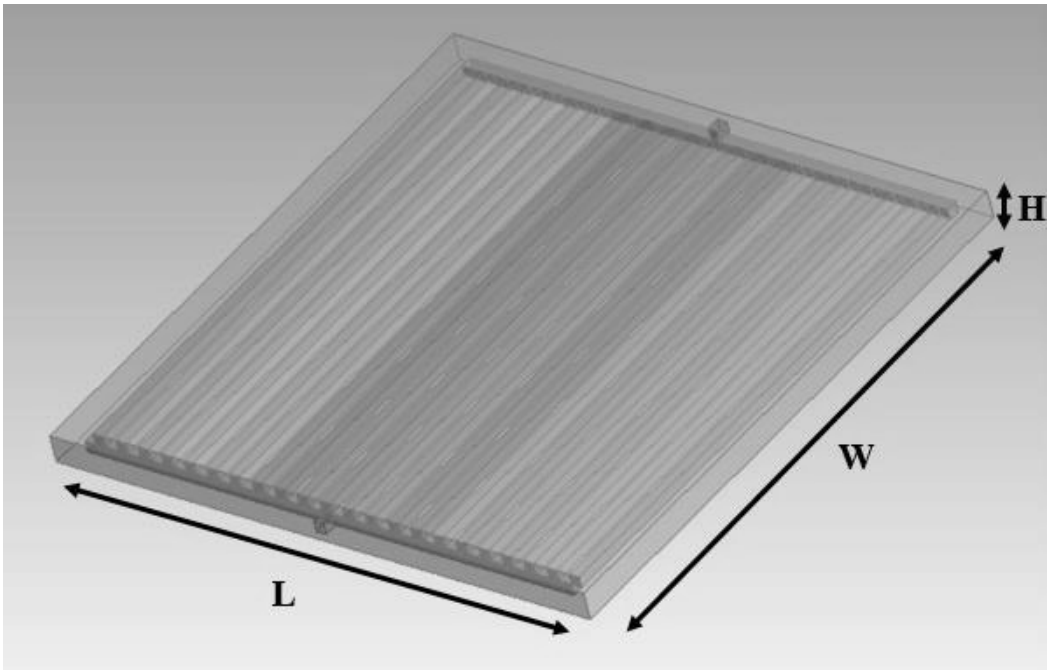


Figure 2. Structure of cooling plate.

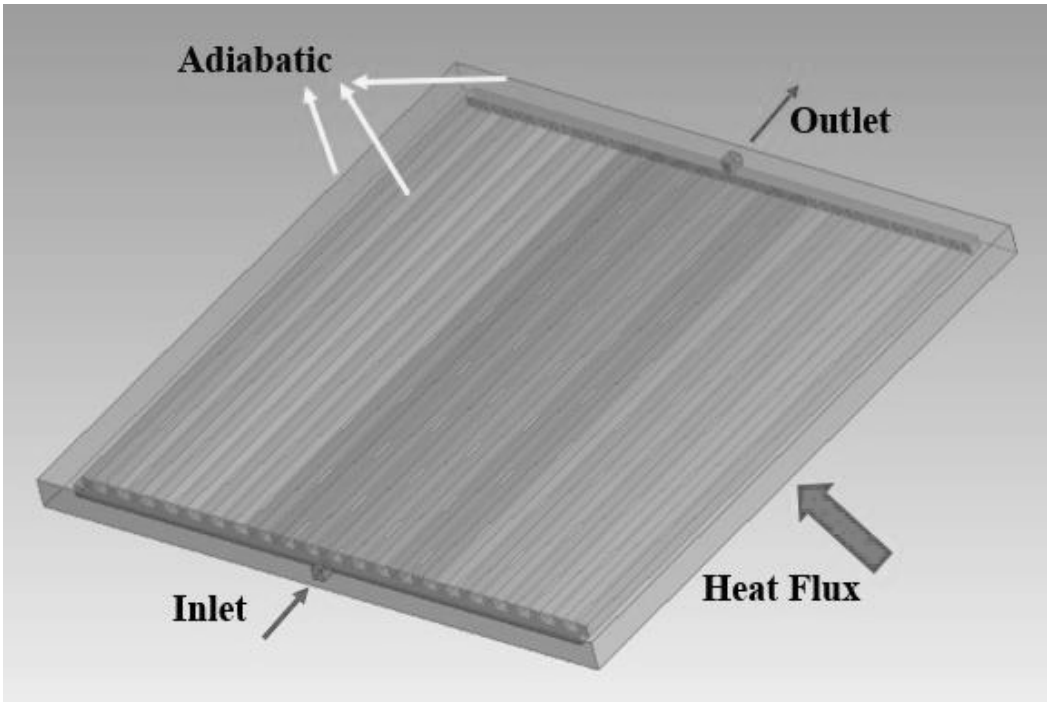


Figure 3. The schematic of CFD analysis model.

Ansys-Fluent software program was applied for numerical solving commercial CFD solver. The conservation of mass, momentum and energy equation can be written as;

$$\frac{\partial u_j}{\partial x_j} = 0 \quad (1)$$

$$\rho u_j \frac{\partial u_i}{\partial x_j} + \frac{\partial p}{\partial x_i} = \mu \Delta u_i \quad (2)$$

$$\rho c u_j \frac{\partial T}{\partial x_j} = \frac{\partial}{\partial x_j}\left(k \frac{\partial T}{\partial x_j}\right) \quad (3)$$

Where u and x represent the velocity and direction vectors, ρ is the density, P is the pressure, μ is the fluid viscosity, T is the temperature, k is the thermal conductivity, Δ is the Laplacian operator.

SIMPLE algorithm was used for the coupling of the continuity and momentum equations. The solution was limited when residuals of x-velocity, y-velocity, z-velocity and energy equations were observed below 10^{-6}. Quad mesh was applied for meshing in this numerical solution. Different mesh elements were tested for independent solution therefore 3,600,000 mesh elements were used for numerical solution (Figure 4).

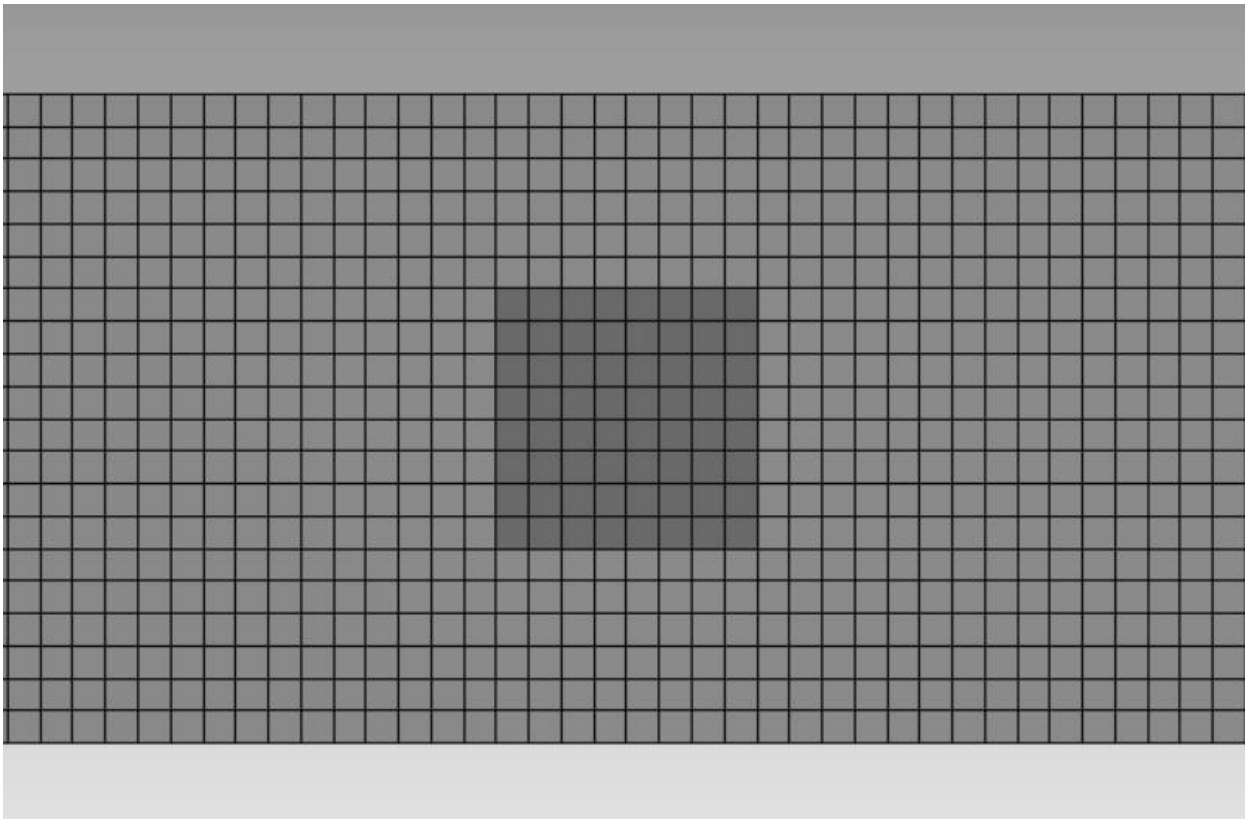
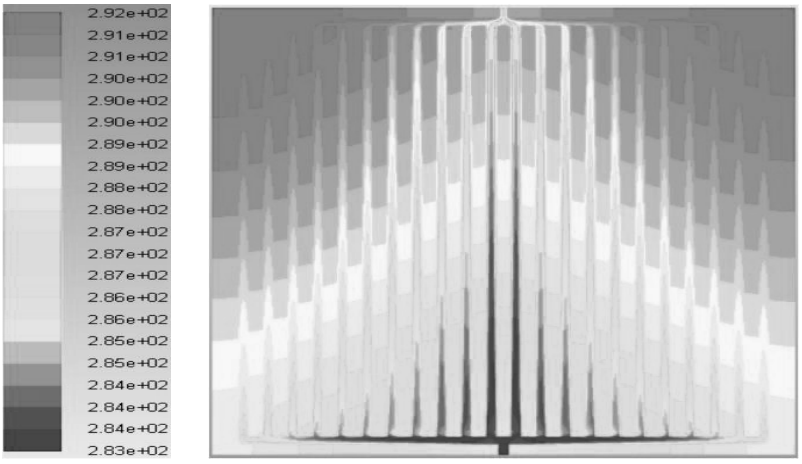


Figure 4. Grid structure for cooling plate.

RESULT AND DISCUSSION

We studied coolant fluid flows along the channels that were set into cold plate. Two models that have same conditions (number of coolant channels and distance between coolant channels)were selected in this study but the inlet of flow is different places. The inlet is in the center of bottom channel in Model A and the corner of bottom channel in Model B. The laminar flow at two different Reynolds numbers (Re=500 and 1000) was applied at a constant heat flux (q=50 *W)* of one surface and the other surfaces are adiabatic boundary condition. Surfaces temperature distribution were shown in center plane section of cooling plate for Model A and Model B at Figure 5 and Figure 6. Results show that coolant flow is more effective in cooling center of cold plate in Model A than Model B at the same Re number. In the Model B coolant flow is more effective in cooling sides of cold plate than Model A at the same Re number.



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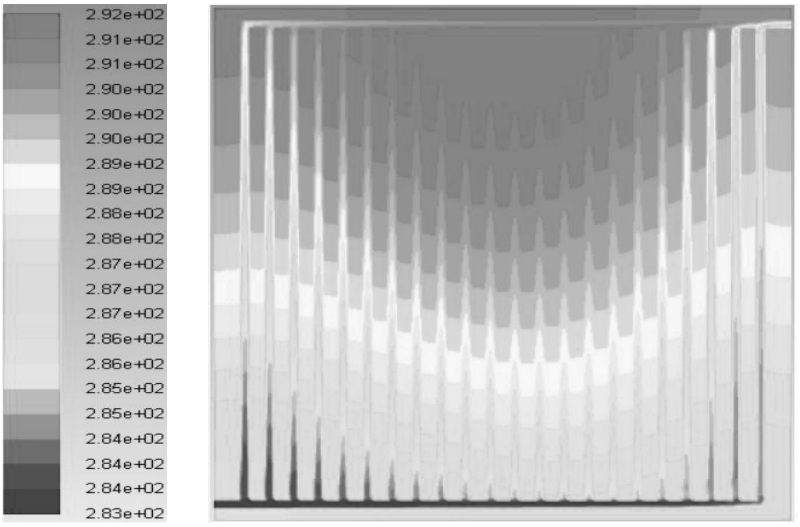
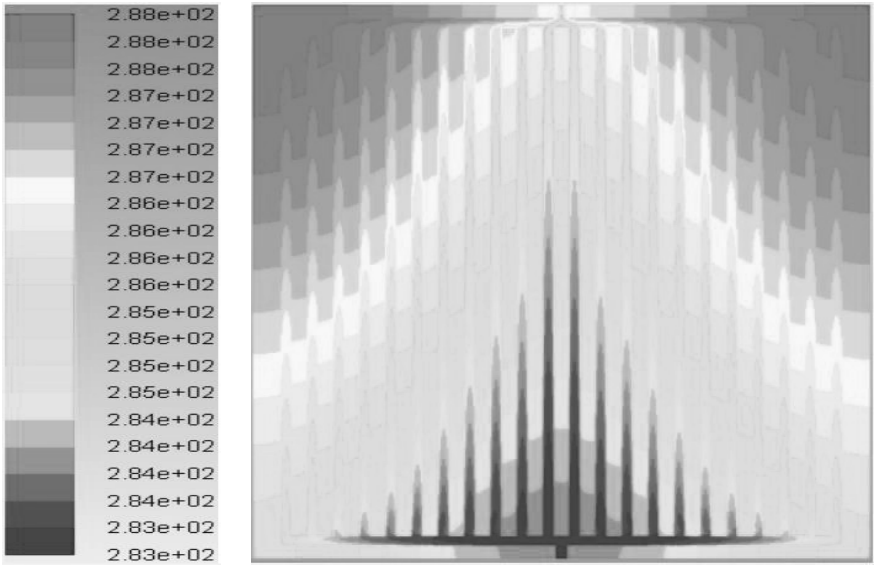


(b)

Figure 5. Surface temperature distribution in cooling plate with constant heat flux (q= 50 *W*) for Model A and Model B at Re=500.



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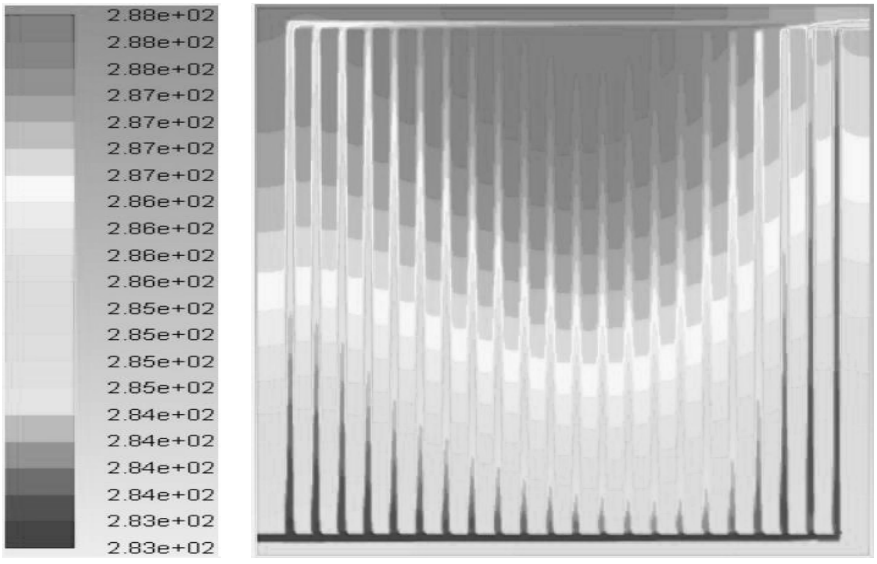

(b)

Figure 5. Surface temperature distribution in cooling plate with constant heat flux (q= 50 *W*) for Model A and Model B at Re=500.

The pressure drop is higher in Model B than Model A for the two Re numbers due to the geometry of model B causing this increase. The temperature distribution is different for the two models but the average temperature of coolant flow in outlet is nearly same for two models at the same Re number. It shows that coolant flow (water) gets the same average temperature at the outlet of the cooling system for both models (Table 1).

	Re=500	Re=1000	Re=500	Re=1000	Re=500	Re=1000
Model A	P_{Inlet}=26.5 Pa	P_{Inlet}=83.7 Pa	$T_{Inlet,ave}$=283.15 K (10°C)	$T_{Inlet,ave}$=283.15 K (10°C)	$T_{Outlet,ave}$=289.40 K (16°C)	$T_{Inlet,ave}$=286.17 K (13°C)
Model B	P_{Inlet}=34.5 Pa	P_{Inlet}=93.1 Pa	$T_{Inlet,ave}$=283.15 K (10°C)	$T_{Inlet,ave}$=283.15 K (10°C)	$T_{Outlet,ave}$=289.23 K (16°C)	$T_{Inlet,ave}$=286.15 K (13°C)

Table 1. Results of the numerical model

Conclusion

The effect of flow inlet location is investigated with two different models (Model A and Model B) in a cold plate. The numerical simulations are carried out for the cooling plate at two different Reynolds numbers with a constant heat flux in a plate surface. The temperature distribution of the cooling plates is different for two models. The average temperature of the outlet is the same for two models. The results show that the outlet temperature does not change so much but temperature distribution changes in two models. We can use one of these models for different local cooling. Further studies can be done with a better design by changing inlet flow location in mini channels.

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