QUYOSH PANELINING FIZIK PARAMETRLARINI SR6130 PHOTOVOLTAIC TRAINER QURRILMASI YORDAMIDA BAHOLASH

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Annotatsiya: Quyosh panellarini Quyosh nurlanish energiyasi hisobidan ishlab chiqargan elektr quvvatini aniqlash, Quyosh fotoelektrik stansiyalar ishlab chiqaradigan energiya miqdorini oldindan bashorat qilish, elektr tarmog`idagi elektr energiyasini barqarorligini taminlash uchun juda muhim hisoblanadi. Quyosh panellarining elektr energiyasini ishlab chiqarishi vaqtida, ishlab chiqarilgan energiyaning quvvatiga tasir etuvchi omillar juda ko`p. Laboratoriya sharoitida Quyosh panellarining ishlab chiqaradigan energiya quvatiga tasir etuvchi omillar: harorat o`zgarishi, radiatsiya miqdori, tok kuchi va kuchlanish o`zgarishlari tajribaviy tadqiqotlar asosida o`rganilgan bo`lib, Quyosh panelining fizik parametrlari laboratoriya sharoitda baholangan.

Kalit so`zlar: Quyosh paneli, harorat, radiatsiya, quvvat, kuchlanish, tok kuchi.

Hozirgi kunga kelib anaviy energiyaga bo`lgan talabni kamaytirishda qayta tiklanadigan energiya texnologiyalarining o`rni juda muhim hisoblanadi[1]. Buning uchun hukumat va davlat tashkilotlari tomonidan katta etibor qaratilmoqda. Energiya ishlab chiqarishda Quyosh energiyasidan foydalanish iqtisodiy va ekologik jihatdan muhim hisoblanadi[2]. Quyosh energiyasini elektr energiyaga aylantirishda Quyosh panellaridan foydalaniladi[3]. Quyosh panellarining ishlash davridagi beradigan quvvat miqdorining uzluksizligini oldindan hisoblashlar asosida baholash, tizim barqarorligini taminlaashga yordam beradi[4-6].

Quyosh paneli tizimlarining mavjudligi, ular talab etadigan xarajatlarning kamayishi tufayli qayta tiklanadigan energiya ishlab chiqarishning eng barqaror usullaridan biri sifatida paydo bo'ldi. Xalqaro qayta tiklanadigan energiya agentligi (IRENA) ma'lumotlariga ko'ra, o'rnatilgan Quyosh panellaridan olinadigan elektr energiyaning quvvati sezilarli darajada oshdi, bu quyosh energiyasini global qayta tiklanadigan energiya manzarasida muhim sohaga aylantirdi ([7]. Ko'p afzalliklariga qaramay, Quyosh paneli tizimlarining samaradorligi operatsion o`zgarishlarga juda moyil. Ushbu nosozliklar, agar o'z vaqtida aniqlanmasa, elektr energiyasi ishlab chiqarishga jiddiy ta'sir ko'rsatishi mumkin, bu esa katta energiya yo'qotilishiga,

ISSN 3030-3907

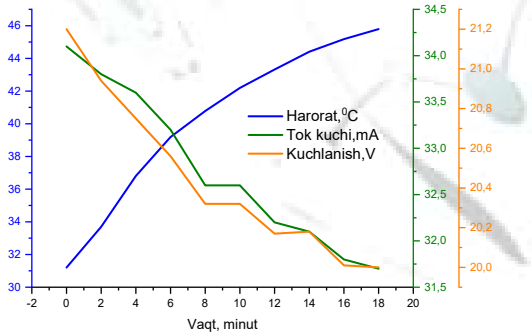
operatsion xarajatlarning oshishiga va panellardan kelib chiqadigan yong'inlar kabi potentsial xavfli vaziyatlarga olib keladi [8].

Quyosh panellarining iishlab chiqaradigan energiya quvvatni bashorat qilishning ikkita asosiy usuli mavjud. Ulardan biri nazariy hisoblashlaga asoslangan bo‘lib, geografik kenglik ma’lumotlari, hamda meteorologik ma’lumotlarga tayangan holda Quyosh radiatsiyasi miqdori asosida fizikaviy tenglamalar bilan nazariy hisoblashlar amalga oshiriladi. Ikkinchi usul laboratoriya sharoitida tajribavi tadqiqotlar o`tkazish usuli hisoblanadi. Bunda elektr lampalardan chiqadigan nurlar Quyosh paneliga yo`naltirilib, Quyosh paneli beradigan quvvat elektron o`lchagichlar yordamida aniqlanadi[9-12]. Bu esa qurilma haqidagi malumotlarni to`liq asoslash imkonini beradi.

Turli xil iqlim sharoitlari uchun Quyosh panellarining quvvatini baholashda laboratoriya sharoitida o`tkazilgan tajribalar natijasining aniqlik darajasi, turli geografik sharoitlar, meteorologik omillar malumotlari asosidagi nazariy baholash usullaridan yuqori hisoblanadi. Laboratoriya sharoitining afzallik tomoni shundaki, Quyosh panellari ishlab chiqadigan elektr energiya quvvatiga tasir etuvchi omillarni boshqarish imkonyatlari mavjud.

Ushbu maqolada Quyosh panellariga laboratoriya sharoita SR6130 Photovoltaic Trainer qurrilmasi yordamida o`zgarmas nurlanish oqimining radiatsiyasi ma`lum vaqt davomida berilganda, Quyosh paneli ishlab chiqadigan tok kuchi va kuchlanishni haroratga bog`liqligi, hamda panel beradigan elektr quvvatining haroratga bog`liqligi tajribaviy tadqiqotlar asosida o`rganilgan.

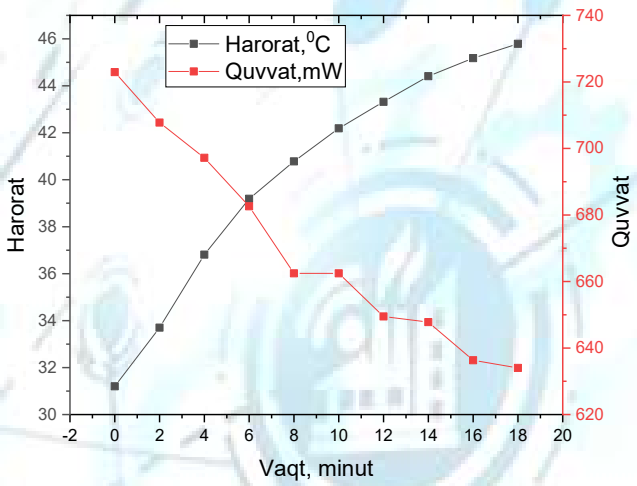
Quyosh paneliga laboratoriya sharoitida 300 vatt nurlanish radiatsiyasi 20 minut davomida Quyosh paneliga tushirilganda harorat, tok kuchi, kuchlanishning bir-biriga bog`liq ravishda o`zgarishlari 1-rasmdagi grafikda keltirilgan. Shu vaqt davomida Quyosh panelining harorati 31 ^{0}C dan 46 ^{0}C gacha ko`tarilgan, u ishlab chiqargan elektr tokidagi tok kuchi 34 mA dan 31.7 mA gacha, kuchlanish esa 21.2 V dan 20 V gacha tushganini ko`rish mumkin.



1-rasm. Harorat, tok kuchi, kuchlanishning vaqt davomidagi bog`liqligi.

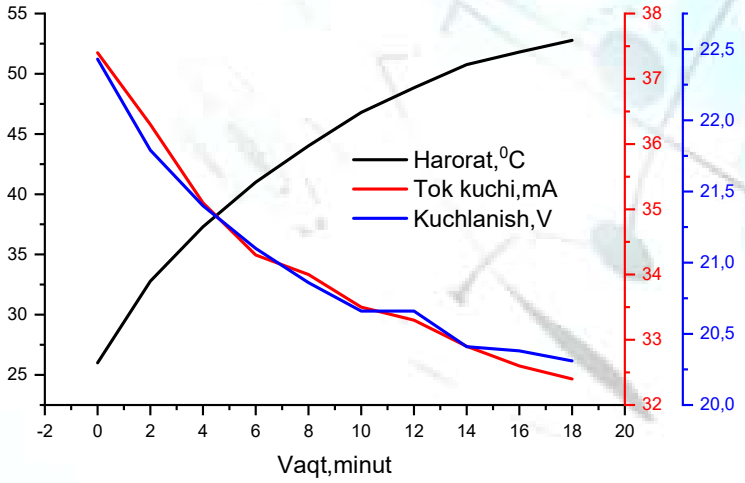
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Quyosh paneliga laboratoriya sharoitida 300 vatt nurlanish radiatsiyasi 20 minut davomida Quyosh paneliga tushirilganda harorat va elektr quvvatining bir-biriga bog`liq ravishda o`zgarishlari 2-rasmdagi grafikda keltirilgan. Shu vaqt davomida Quyosh panelining harorati 31 ^{0}C dan 46 ^{0}C gacha ko`tarilgan, u ishlab chiqargan elektr tokining quvvati 723 mW dan 634 mW gacha tushganini ko`rish mumkin.



2-rasm. Harorat va tok quvvatini vaqt davomidagi bog`liqligi.

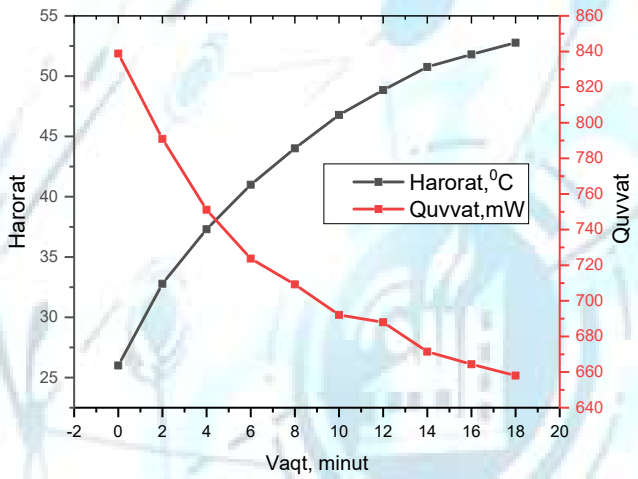
Quyosh paneliga laboratoriya sharoitida 500 vatt nurlanish radiatsiyasi 20 minut davomida Quyosh paneliga tushirilganda harorat, tok kuchi, kuchlanishning bir-biriga bog`liq ravishda o`zgarishlari 3-rasmdagi grafikda keltirilgan. Shu vaqt davomida Quyosh panelining harorati 26 ^{0}C dan 53 ^{0}C gacha ko`tarilgan, u ishlab chiqargan elektr tokidagi tok kuchi 37.4 mA dan 32.4 mA gacha, kuchlanish esa 22.43 V dan 20.31 V gacha tushganini ko`rish mumkin.



3-rasm. Harorat, tok kuchi, kuchlanishning vaqt davomidagi bog`liqligi

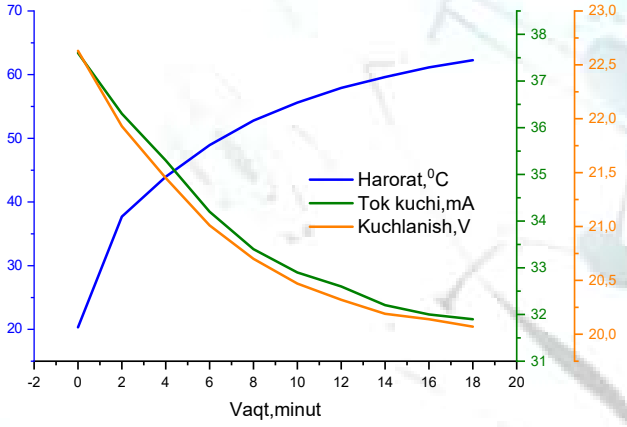
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Quyosh paneliga laboratoriya sharoitida 500 vatt nurlanish radiatsiyasi 20 minut davomida Quyosh paneliga tushirilganda harorat va elektr quvvatining bir-biriga bog`liq ravishda o`zgarishlari 4-rasmdagi grafikda keltirilgan. Shu vaqt davomida Quyosh panelining harorati 26 ^{0}C dan 53 ^{0}C gacha ko`tarilgan, u ishlab chiqargan elektr tokining quvvati 838 mW dan 658 mW gacha tushganini ko`rish mumkin.



4-rasm. Harorat va tok quvvatini vaqt davomidagi bog`liqligi.

Quyosh paneliga laboratoriya sharoitida 700 vatt nurlanish radiatsiyasi 20 minut davomida Quyosh paneliga tushirilganda harorat, tok kuchi, kuchlanishning bir-biriga bog`liq ravishda o`zgarishlari 5-rasmdagi grafikda keltirilgan. Shu vaqt davomida Quyosh panelining harorati 20.3 ^{0}C dan 62.2 ^{0}C gacha ko`tarilgan, u ishlab chiqargan elektr tokidagi tok kuchi 37.6 mA dan 31.9 mA gacha, kuchlanish esa 22.63 V dan 20.07 V gacha tushganini ko`rish mumkin.

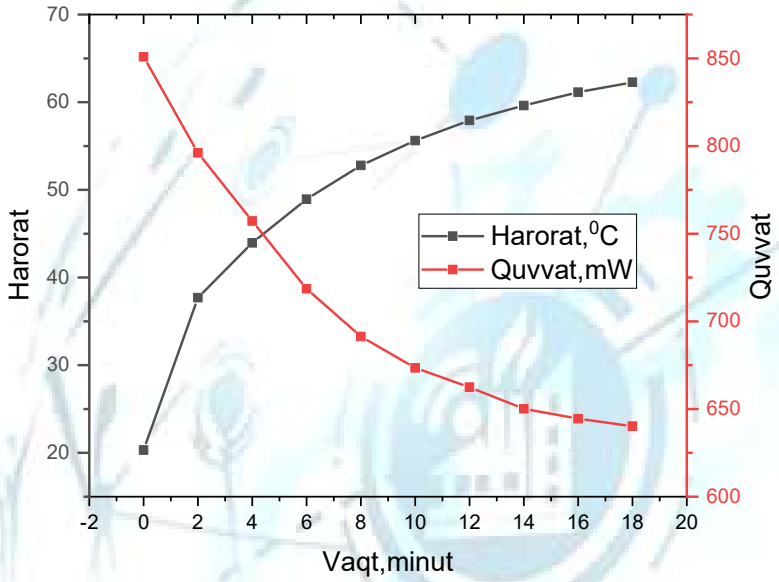


5-rasm. Harorat, tok kuchi, kuchlanishning vaqt davomidagi bog`liqligi.

Quyosh paneliga laboratoriya sharoitida 700 vatt nurlanish radiatsiyasi 20 minut davomida Quyosh paneliga tushirilganda harorat va elektr quvvatining bir-

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biriga bog`liq ravishda o`zgarishlari 6-rasmdagi grafikda keltirilgan. Shu vaqt davomida Quyosh panelining harorati 20.3 ^{0}C dan 62.2 ^{0}C gacha ko`tarilgan, u ishlab chiqargan elektr tokining quvvati 850.8 mW dan 640.2 mW gacha tushganini ko`rish mumkin.



6-rasm. Harorat va tok quvvatini vaqt davomidagi bog`liqligi.

XULOSA VA TAKLIFLAR

Quyosh panellarini quvvatini aniqlash va panellar ishlab chiqaradigan energiya miqdorini oldindan bashorat qilish uchun laboratoriya sharoitida SR6130 Photovoltaic Trainer qurilmasi yordamida tajribaviy tadqiqotlar o`tkazilgan. Tajribalar 300 W, 500 W va 700 W o`zgarmas nurlanish radiatsiyasi 20 minut vaqt davomida Quyosh paneliga yo`naltirilganda, har 2 minut vaqt oralig`ida panel sirtining harorati, panel ishlab chiqqan elektr tokidagi tok kuchi va kuchlanish qiymatlari o`lchab borilgan. Natijada panel sirtiga nurlanish radiatsiyasi tushishi bilan panel sirtidagi haroratni ko`tarilishi va tok kuchi, hamda kuchlanish miqdorlarining mos ravishda tushushi aniqlangan.

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ISSN 3030-3907