

# Induction Heating Based Flood Water Evaporator

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**Abstract-** Floods are among the most damaging natural hazards. Flood disasters have increased considerably worldwide in recent years. Due to overall dense urbanization where there is too much concrete, and no natural buffers like lakes and open spaces, rainwater can't move anywhere so it stagnates on the roads, around the residency. So we find out the solution to overcome the flood water stagnating by converting the water into steam with the help of the induction heating principle.

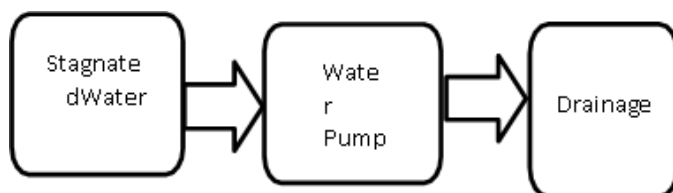
**Keywords-** Floods disaster, Induction heating principle.

## I. INTRODUCTION

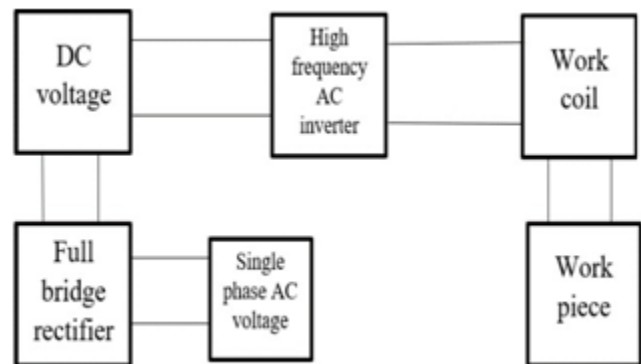
Natural hazards such as floods, storms, tsunamis, and others pose a significant threat to lives and property around the world. Without proper solutions and effective mitigation measures, these natural perils often culminate in disasters that have severe implications in terms of economic loss, social disruptions, and damage to the urban environment. Chennai city is situated in Tamil Nadu (India). Its suburb areas unexpectedly recorded manifold heavy rainfall measures during November and December 2015. The rain gauge geographical areas that are highly affected by the Chennai floods are taken as references for our work. Solution to this problem to convert flood water into water vapour.

## II. BLOCK DIAGRAM OF EXISTING SYSTEM

In this existing system, the flood water is sucked through the pump and this water is discharged in another area or empty space. Here, they transfer the water from one place to another place.



## III. BLOCK DIAGRAM OF PROPOSED SYSTEM

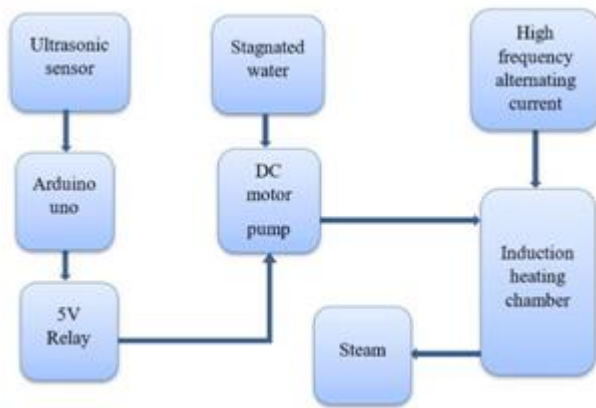


In this, the high frequency AC module is used. In order to get high frequency and alternating current, rectifier and inverter. The rectifier which converts the single phase AC into the DC 110v. So, then the DC is passed into the high frequency AC inverter which uses a IGBT. Then the 110v Dc converted into the high frequency alternating current. So, the high frequency AC is given to the work coil. The work coil acts like primary of transformer. When the high frequency AC is given, it produces the alternating flux because flux is directly proportional to current.

Then, the work coil act as a secondary of the transformer which is consider as a short circuit.

So the flux produced in the work coil is linked with workpiece and emf is induced in the workpiece and then the current start circulating. This circulating current is known as eddy current loss. And this loss producing the heat.

This heat evaporates the water. In order to increase the heat loss, eddy current loss, skin effect, joule heating is used.



#### IV. WORKING

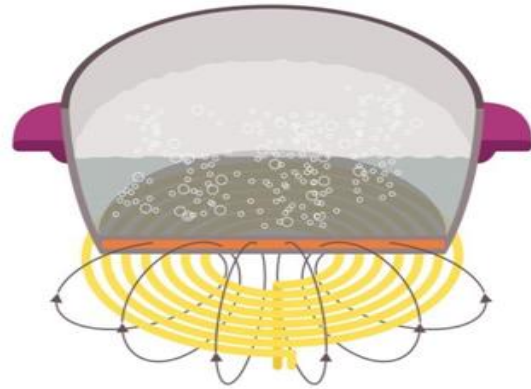
Initially, the water is filled in the container. Above the container, an ultrasonic sensor is fixed. The ultrasonic sensor senses the water level. When the water level is above the 10cm it senses and send the corresponding signal to Arduino uno. So, the Arduino uno turns ON the DC pump for 1.5ms and then it turns OFF the DC pump for 30s. This process is continuously repeating when the condition is true. So, the water in the work piece which is passed through the hose is evaporated. If the water level is below the 10cm in the container, the ultrasonic sensor senses and it sends the corresponding signal to the Arduino uno. So, that the Arduino controls the DC pump being turn OFF. In between Arduino and DC pump a 5V relay is used to control the DC pump through the relay.

The working principle of the induction heating process is a combined recipe of Electromagnetic induction and Joule heating. Induction heating process is the non-contact process of heating an electrically conductive metal by generating eddy currents within the metal, using electromagnetic induction principle. As the generated eddy current flows against the resistivity of the metal, by the principle of Joule heating, heat is generated in the metal. Knowing the Faraday's law is very useful for understanding the working of induction heating.

According to Faraday's law of electromagnetic induction, changing the electric field in the conductor gives rise to an alternating magnetic field around it, whose strength depends on the magnitude of the applied electric field.

This principle also works vice versa when the magnetic field is changed in the conductor. So, the above principle is used in the inductive heating process. When Alternating current is passed through the coil, an alternating magnetic field is generated around it as per Faraday's law.

When the material placed inside the inductor comes in the range of this alternating magnetic field, eddy current is generated within the material. Now the principle of Joule heating is observed. According to this when a current is passed through a material heat is generated in the material. So, when current is generated in the material due to the induced magnetic field, the flowing current produces heat from within the material. This explains the process of non-contact inductive heating. So the flood water inside the vessel becomes heated and further heating produces evaporation.



By increasing the frequency and current level, heat produced in the chamber is increases. Because, the eddy current loss is directly proportional to the square of the frequency and when the current increases the ohmic losses are increases because the ohmic losses is directly proportional to square of the current.

Principles used in the project:

- Induction Heating
- Skin effect
- Eddy Current Loss
- $P_e(W) = K_e \times B^2 \times F(Hz)^2 \times t^2 \times V$  Watts
- Joule Heating
- $R = \rho l/A$

**ADVANTAGES:**

- Chances of loss of lives, vegetation and infrastructure are reduced.
- Flood can be easily evaporated.
- Less complicated in design.

**APPLICATIONS:**

- Can be used in urban areas.
- In draining of flood water in school, college and hospital.

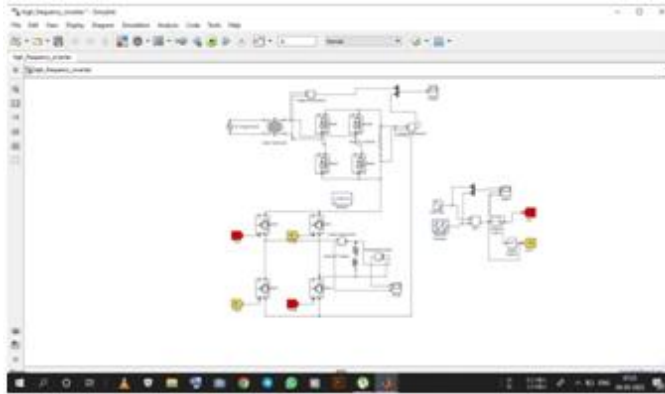
- Can be used in lowness area.
- In draining of water in road side.

#### SOFTWARE REQUIRED:

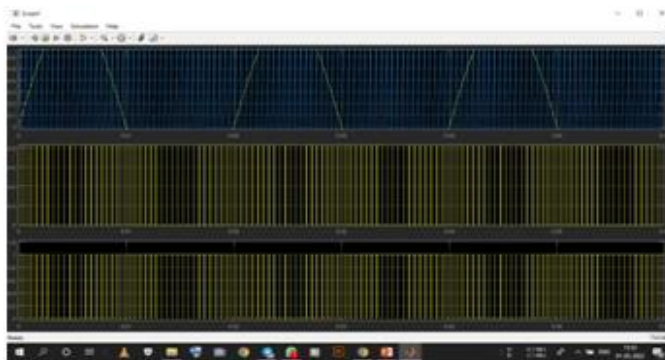
- Matlab
- Cenosis induction heating platform.

### V. SIMULATION RESULTS

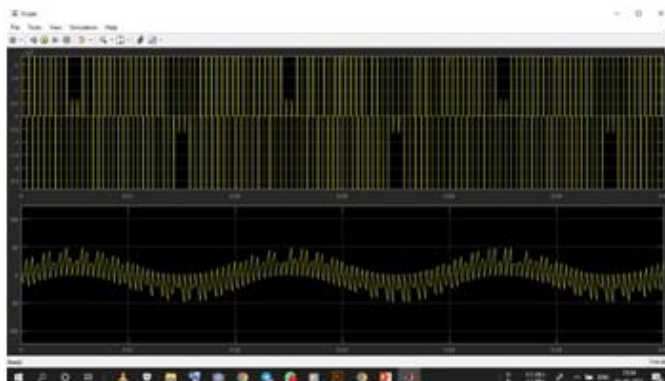
#### SIMULATION OF HIGH FREQUENCY AC INVERTER



#### SIMULATION OF PULSE GENERATOR



#### SIMULATION OF HIGH FREQUENCY AC



### VI. CONCLUSION

In this report, a high frequency and high current is produced by the IGBT and pulse is generated by PWM technique. So, the alternating current in the work coil produces the alternating flux and it is linking with the work piece. High current is produced in work piece evaporates the water. The proposed system takes 15 seconds for evaporation of 5ml flood water. To reduce the time taken to evaporate the flood water, current value in the work piece have to increase. The current value is increased by increasing the number of turns in the work coil.

### VII. FUTURE SCOPE

In future the induction heating chamber is made to fully automated by getting the inputs from the ultrasonic sensor. The cylindrical work piece is replaced by the flat type of work piece therefore the diameter is increased and the heat produced in the work piece is uniformly distributed. And the flood water is passed to the work piece is sprinkle type. So, the water gets evaporated easily.

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