

Abstract

An explicit finite-difference method is used to simulate the thermal performance of short-term thermal storage for a focusing, indoor, institutional, solar cooker. The cooker storage unit consists of a cylindrical solid block. The block is enclosed in a uniform layer of insulation except where there are cavities on the top and bottom surfaces to allow heating of a pot from storage and heating of the storage by solar radiation. A paraboloidal concentrator focuses solar radiation through a secondary reflector onto a central circular zone of the storage block through the cavity in the insulation. The storage is charged for a set period of time and heat is subsequently discharged to a pot of water. In these simulations a pot of cold water is placed on the hot storage block and the time then estimated until the water either boils or the temperature of the water reaches a maximum value. Simulations are made for a given pot capacity with the storage block made from either cast iron or granite (rock). The effects on cooker performance are compared for a variety of height to diameter ratios of the storage block and size of the area of solar input zone.