

Mathematical Modeling of a Sub-Wet Bulb Temperature Evaporative Cooling Using Porous Ceramic Materials

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Abstract : Indirect Evaporative Cooling process has the advantage of supplying cool air at constant moisture content. However, such system can only supply air at temperatures above wet bulb temperature. This paper presents a mathematical model for a sub-wet bulb temperature indirect evaporative cooling arrangement that can overcome this limitation and supply cool air at temperatures approaching dew point and without increasing its moisture content. In addition, the use of porous ceramics as wet media materials offers the advantage of integration into building elements. Results of the computer show that the proposed design is capable of cooling air to temperatures lower than the ambient wet bulb temperature and achieving wet bulb effectiveness of about 1.17.

Keywords : indirect evaporative cooling, porous ceramic, sub-wet bulb temperature, mathematical modeling

Conference Title : ICSRD 2020 : International Conference on Scientific Research and Development

Conference Location : Chicago, United States

Conference Dates : December 12-13, 2020