as well as to minimize liquid entrainment into the air stream. In evaporators, vacuums and plates have been used to increase the rate of evaporation. In some evaporative systems, a liquid is sprayed to produce more interfacial area partitioning the liquid and gas. Examples of prior art, gas/liquid contact assemblies (for evaporative coolers, humidifiers, heat exchangers, etc.) are illustrated in U.S. Pat. No. 3,792,841, 3,395,903, 3,500,615, 5,055,239 and 5,811, 035.

[0165] In this invention, the interfacial area is increased based upon the wetting out of the microreplicated film surface, and the entrainment of the liquid phase in the gas stream is minimized due to increased surface attachments (i.e., the increased contact area between the structure and the liquid). Experiments showed that in some cases, 100% improvement in mass transfer can be achieved, compared to non-microstructured surfaces, and that the added solid/liquid interface provides for added liquid attachment which will decrease the likelihood of air entrainment of the liquid. In other applications (e.g., humidification), foams and fibrous structures like pleated papers are often used as the liquid support surface. In these applications, scaling of non-volatile components typically builds up on the surface, which leads to the growth of organisms and decreased humidification performance. Using the microstructured film of the present invention, such scaling can be easily cleaned off or removed. With respect to the growth of algae and/or bacteria, anti-microbial agents can be impregnated into the film material to prevent the growth thereof.

[0166] In the case where an entrained mist or fog is to be coalesced, the present invention presents a means whereby a liquid encounters a high surface area media which allows the liquid droplets to attach to the surface more effectively than to a smooth surface. Wicking action along the surface of the microstructured media facilitates liquid flow, without obstructing the flow of liquid through the condensate collection device, thereby minimizing pressure drop across the media and efficiently channeling water in a desired manner to a desired location.

[0167] In one preferred embodiment, the invention is an assembly for enhancing the rate of evaporation of a liquid moving over a surface which comprises a film having first and second surfaces and means for causing the liquid to move across the first surface of the film. The first surface is a polymeric microstructure-bearing surface having channels thereon and is adapted for supporting a moving liquid thereon. The channels are defined by generally spaced apart protrusions with valleys therebetween so that the exposed evaporatively active surface area of the liquid on the first surface is increased by meniscus height variations of the moving liquid in each channel. The means for causing the liquid to move may comprise any suitable potential generating structure or system, such as a pump, pressure differential, gravity, etc., or any combination thereof.

[0168] In the following examples, the channels on the fluid transport film were parallel and orientated in the direction of liquid flow. However, this need not always be the case. Additional options for relative channel and liquid flow orientations are possible, including channels that extend orthologically relative to the fluid flow, or are biased relative to fluid flow direction, as well as the possibility of providing further projections from the micro-replicated surface to provide for increased interfacial surface area.

[0169] The evaporation or cooling rate of this group of experiments was determined using an experimental set-up that incorporated a 45E inclined plane substrate **280**, as seen in **FIG. 17***a*. The substrate **280** has a planar upper surface **282** with an upper end **284** and a lower end **286**. A layer of polythene film **290** is aligned on the upper surface **282** of the substrate **280**. In these experiments, the polythene layer **290** was not adhered to the upper surface **282**; it was just laid out on the upper surface **282**.

[0170] A water source **292** had a conduit **294** directed to deposit water **295** onto the film **290** adjacent the top end **284** of the substrate **280**. The water **295** flowed down the film **290**, was collected adjacent the bottom end **286** in a collection dam (not shown) and from there deposited into a collection reservoir **296**. The film **290** in each instance was 4 inches wide, and the temperature of the water was measured at the top of the film, and then again at the bottom of the film. Air flow over the microstructured surface of the film **290** was provided using a standard carpet fan **298** positioned adjacent the bottom end **286** of the substrate **280**. As shown, the air flow from the fan **298** was directed in the opposite direction of the water flow on the film **290**. The air speed provided by the fan **298** was controlled by limiting the entrance area to the fan **298**, and was measured using a hot wire anemometer adjacent the surface of the film **290**.

[0171] The experiments using this system evaluated air speed effects, water flow rate and film surface microtopography. The data is presented as the water temperature differential between the top of the film and the bottom of the film, where the temperature of the water decreased as a function of the evaporation rate and associated latent heat of the water. The air was standard laboratory interior air, nominally at 70EF and 50% relative humidity.

[0172] The following five materials were tested:

Example 12

[0173] A smooth polythene film contains a 0.5% TRITON™ X-100 additive by weight.

Example 13

[0174] A polythene film having a microstructured channel surface with linear channels. The polythene film contained a 0.5% TRITON™ X-100 additive by weight. The mold pattern tooling used to make the film's microstured surface had a pattern face formed to define channels with 45 degree groove angles β, 20 mil deep (see, e.g., **FIG. 17***b*). The channels were aligned to run down the incline defined by the substrate **280**.

Example 14

[0175] A polythene film contains a microstructured channel surface with linear channels. The polythene film contained a 0.5% TRITON™ X-100 additive by weight. The mold pattern tooling used to make the film's microstured surface had a pattern face formed to define channels with 80 degree groove angles, 10 mil deep. The channels were aligned to run down the incline defined by the substrate **280**.

Example 15

[0176] A polythene film having a microstructured channel surface with linear channels. The polythene film contained a