SUMMARY OF THE INVENTION

[0006] In one aspect, the present invention is directed to an upper cross flow tray paired with a lower cross flow tray for facilitating interaction between fluid streams in a mass transfer column. The upper and lower cross flow trays each have a tray deck with apertures and a downcomer. At least one, or all, of the downcomers comprise a wall extending downwardly from a tray deck of one of the upper and lower cross flow trays to below the tray deck of the other one of the upper and lower cross flow trays. The wall of the downcomer is connected to and provides structural support for both of the tray decks. In one embodiment, support angles extend along the upper and lower margins of the wall to provide horizontal surfaces to which a chordal edge of the tray decks are bolted or otherwise secured. An inlet panel is positioned to close the bottom of the downcomer and discharge openings are provided in the wall of the downcomer at a location above the tray deck of the other one of the upper and lower cross flow trays so that liquid is discharged from the downcomer, through the discharge openings, and onto the tray deck. The inlet panel is also secured to or coupled with the wall of the downcomer. In one embodiment, the downcomer is a center or off-center downcomer having two of the walls positioned in spaced-apart and parallel-extending relationship. In another embodiment, the downcomer is a side downcomer having only one of the walls.

[0007] In another aspect, the present invention is directed to a mass transfer column in which the upper and lower cross flow trays described above are positioned in horizontally-extending and vertically spaced-apart relationship. In this aspect, the mass transfer column comprises a shell and an open internal region in which a plurality of pairs of horizontally-extending upper cross flow trays and lower cross flow trays are positioned in vertically spaced-apart relationship, said upper and lower cross flow trays each having a tray deck with apertures and a downcomer, at least one of said downcomers comprising a chordal wall extending downwardly from a tray deck of one of said upper and lower cross flow trays to below the tray deck of an underlying one of said upper and lower cross flow trays and discharge openings positioned in said wall at a location to permit liquid to pass through said discharge openings and onto said tray deck of the underlying one of said upper and lower cross flow trays, wherein said wall is connected to and provides structural support for said tray deck of said one of said upper and lower cross flow trays and said tray deck of said underlying one of said upper and lower cross flow trays.

[0008] In a further aspect, the present invention is directed to a method of supporting the tray decks of the cross flow trays described above in a mass transfer column using the downcomer positioned on one ~~or more, or all, of the upper and lower cross flow trays~~of said cross flow trays and having a chordal wall that extends downwardly from said one of said cross flow trays and having a chordal wall that extends downwardly from said one of said cross flow trays to below an underlying one of said cross flow trays. The method