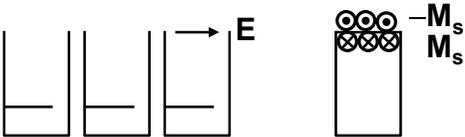# Finite Waveguide Phased Array Analysis

- **Analysis of waveguide array using Method of Moments**
  - Each aperture covered by a perfect electric conductor
  - To maintain a continuous tangential electric field across the aperture, magnetic currents (with opposite signs) are placed on the waveguide and half-space sides of the aperture cover

$$M_{sj} = \hat{n} \times E_j, \quad j = 1, 2, \cdots, N_a$$

  - The tangential magnetic field must also be continuous across each aperture
  - The tangential magnetic field on the waveguide side of each aperture is the summation of the incident field from the waveguide source and the field from the magnetic current placed inside the aperture cover
  - On the half-space side of each waveguide cover, there is a contribution to the magnetic field from each of the array element sources

$$H_{ti}^{wg}(M_{si}) + H_{ti}^{inc} = \sum_{j=1}^{N_a} H_{tij}^{hs}(-M_{sj})$$