

### Problem 204A

Axial flow fans usually have no input stator vanes so that  $\alpha_1 = 90^\circ$ . Moreover the discharge flow is not treated in a way that would make use of the rotational or circumferential velocity. If all the kinetic energy associated with at rotational velocity is lost, express the loss as a fraction of the total head rise and present your answer in terms of  $\psi$  and  $\phi$ . [Neglect all other losses.]