

FLUID DYNAMICS- ASSIGNMENT FOR UNIT-IV

ANSWER ALL THE PROBLEMS

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1. What do you understand by stream function and velocity potential? Give the relation between them.
2. In a two-dimensional field the velocity components are given by
$$U=A(x^2 - y^2); V= 4xy,$$
 where A is a constant
 - a. Determine the value of A.
 - b. Find the stream function of the flow.
 - c. Show that the flow is irrotational and hence find the velocity potential.
3. Show that for an irrotational flow the stream function(ψ) and the velocity potential(ϕ) are harmonic and the curves $\phi =c_1$, $\psi=c_2$ are equipotential.
4. Obtain the complex potential for
 - i. Simple source.
 - ii. Uniform stream incident to the positive x-axis at an angle α .
 - iii. Line vortices.
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