Домашня робота

№39

в) $\operatorname{div}(\vec{A}\times\vec{B}) = \vec{B}\cdot\operatorname{rot}\vec{A} - \vec{A}\cdot\operatorname{rot}\vec{B}$

$\operatorname{div}(\vec{A}\times\vec{B}) = \nabla\cdot(\vec{A}\times\vec{B}) + \nabla\cdot(\vec{A}\cdot\vec{B}) =$

$= \vec{B}\cdot(\nabla\times\vec{A}) + \vec{B}(\nabla\times\vec{A}) = \vec{B}\operatorname{rot}\vec{A} + \vec{A}(\vec{B}\times\nabla) =$

$= \vec{B}\operatorname{rot}\vec{A} - \vec{A}\operatorname{rot}\vec{B}$

г) $\operatorname{rot}(\bar{A}\times\bar{B}) = \bar{A}\operatorname{div}\bar{B} - \bar{B}\operatorname{div}\bar{A} + (\bar{B}\cdot\nabla)\bar{A} - (\bar{A}\cdot\nabla)\bar{B}$

$\operatorname{rot}(\bar{A}\times\bar{B}) = [\nabla\times(\bar{A}\times\bar{B})] = \bar{A}(\nabla\cdot\bar{B}) - \bar{B}(\nabla\bar{A}) + \bar{A}(\nabla\bar{B}) - \bar{B}(\nabla\bar{A}) =$

$= (\bar{A}\nabla)\bar{B} - \bar{B}\operatorname{div}\bar{A} + \bar{A}\operatorname{div}\bar{B} - (\bar{B}\nabla)\bar{A}$

е) $\operatorname{grad}(\bar{A}\cdot\bar{B}) = \bar{A}\times\operatorname{rot}\bar{B} + \bar{B}\times\operatorname{rot}\bar{A} + (\bar{B}\nabla)\bar{A} + (\bar{A}\nabla)\bar{B}$

$\operatorname{grad}(\bar{A}\cdot\bar{B}) = \nabla(\bar{A}\bar{B}) + \nabla(\bar{A}\bar{B}) = \bar{A}\times(\nabla\times\bar{B}) + (\bar{B}\nabla)\bar{A} +$

$+ \bar{B}\times(\nabla\times\bar{A}) + (\bar{A}\nabla)\bar{B} = \bar{A}\times\operatorname{rot}\bar{B} + (\bar{B}\nabla)\bar{A} + \bar{B}\times\operatorname{rot}\bar{A} + (\bar{A}\nabla)\bar{B}$

№40

е) $(\nabla\times\bar{A})\times\bar{B} = \bar{A}\operatorname{div}\bar{B} - (\bar{A}\cdot\nabla)\bar{B} - \bar{A}\times\operatorname{rot}\bar{B} -$

$-\bar{B}\times\operatorname{rot}\bar{A}$

$(\nabla\times\bar{A})\times\bar{B} = (\nabla\times\bar{A})\times\bar{B} + (\nabla\times\bar{A})\times\bar{B} = (\nabla\times\bar{A})\times\bar{B} - (\bar{A}\times\nabla)\times\bar{B}$

$= -\bar{B}\times(\nabla\times\bar{A}) - (\bar{A}\cdot\nabla)\bar{B} - \bar{A}\times(\nabla\times\bar{B}) + \bar{A}\cdot(\nabla\cdot\bar{B}) =$

$= \bar{A}\operatorname{div}\bar{B} - (\bar{A}\cdot\nabla)\bar{B} - \bar{A}\times\operatorname{rot}\bar{B} - \bar{B}\times\operatorname{rot}\bar{A}$