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Electric Multipole Plots

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Order	Name	Sample Point Form	Potential	Electric field	Spherical Moments	Cartesian Moments
$l = 0$	monopole	$+ \bullet$	$\Phi \propto \frac{1}{r}$	$E \propto \frac{1}{r^2}$	q_{00}	q
$l = 1$	dipole	$\begin{matrix} + \bullet \\ - \bullet \end{matrix}$	$\Phi \propto \frac{1}{r^2}$	$E \propto \frac{1}{r^3}$	q_{1-1}, q_{10}, q_{11}	p_x, p_y, p_z
$l = 2$	quadrupole	$\begin{matrix} + \bullet & - \bullet \\ - \bullet & + \bullet \end{matrix}$	$\Phi \propto \frac{1}{r^3}$	$E \propto \frac{1}{r^4}$	$q_{2-2}, q_{2-1}, q_{20}, q_{21}, q_{22}$	$\begin{matrix} Q_{xx}, Q_{xy}, Q_{xz} \\ Q_{yx}, Q_{yy}, Q_{yz} \\ Q_{zx}, Q_{zy}, Q_{zz} \end{matrix}$
$l = 3$	octupole	$\begin{matrix} + \bullet & - \bullet & + \bullet \\ - \bullet & + \bullet & - \bullet \\ + \bullet & - \bullet & + \bullet \end{matrix}$	$\Phi \propto \frac{1}{r^4}$	$E \propto \frac{1}{r^5}$	$\begin{matrix} q_{3-3}, q_{3-2}, q_{3-1}, \\ q_{30}, q_{31}, q_{32}, q_{33} \end{matrix}$	$\begin{matrix} Q_{ijk} \\ i, j, \text{ and } k = x, y, \text{ or } z \end{matrix}$
...						
l	l -pole	-	$\Phi \propto \frac{1}{r^{l+1}}$	$E \propto \frac{1}{r^{l+2}}$	$q_{l,-l}, q_{l,-l+1}, \dots, q_{l,l-1}, q_{l,l}$	$\begin{matrix} Q_{ijk\dots l} \\ i, j, k, \dots, l = x, y, \text{ or } z \end{matrix}$

q :

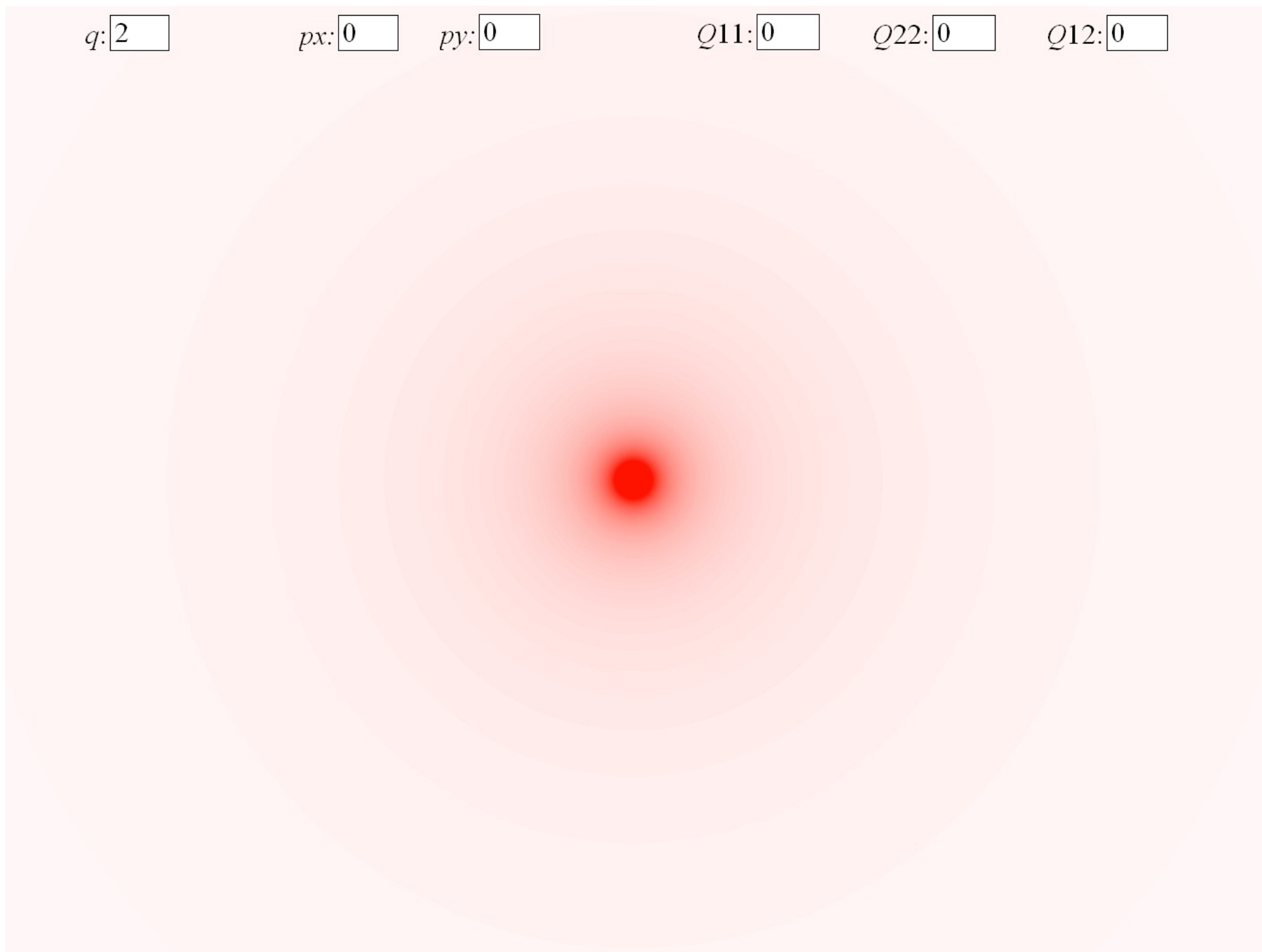
px :

py :

Q_{11} :

Q_{22} :

Q_{12} :



q :

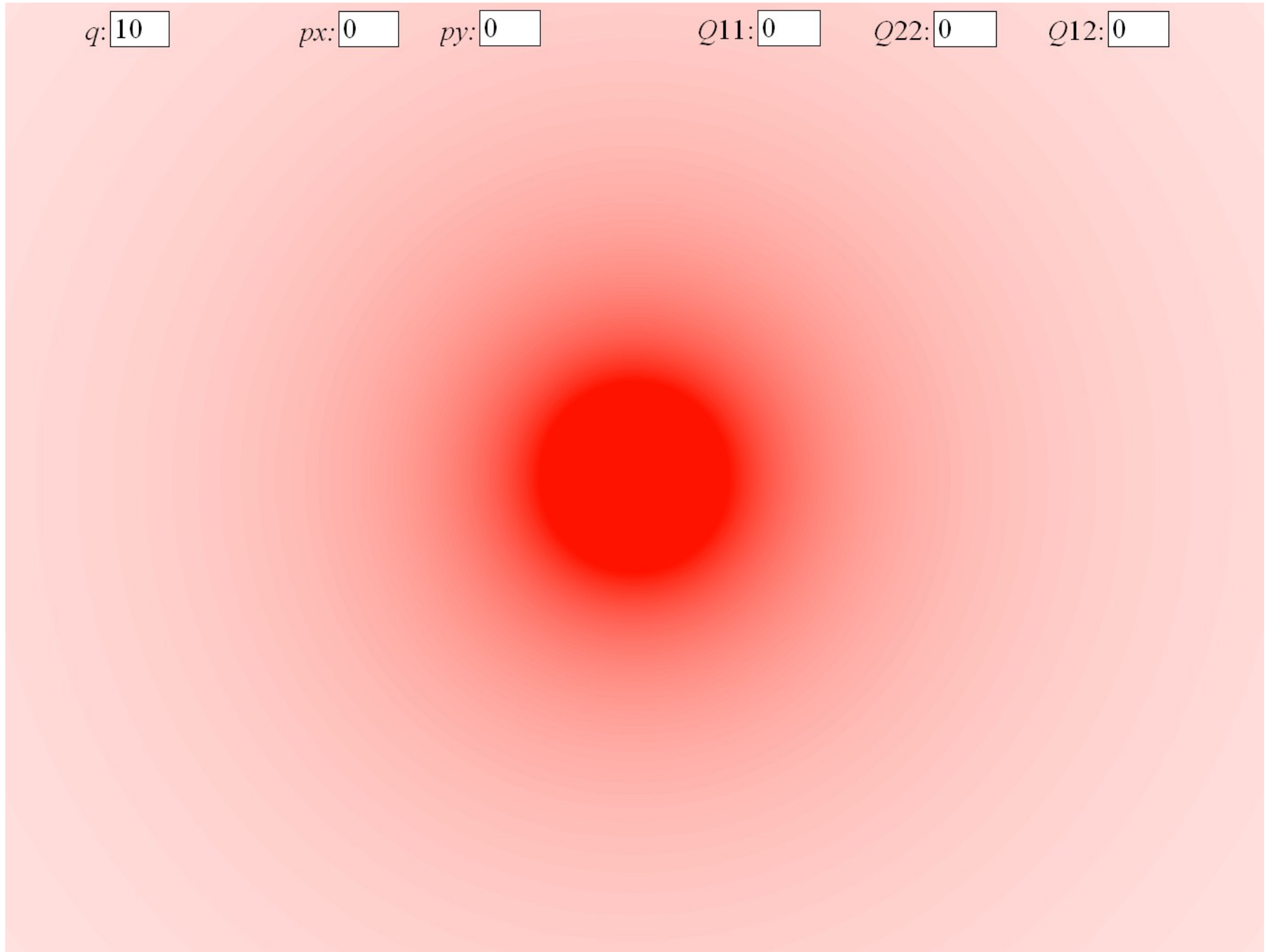
px :

py :

Q_{11} :

Q_{22} :

Q_{12} :



q :

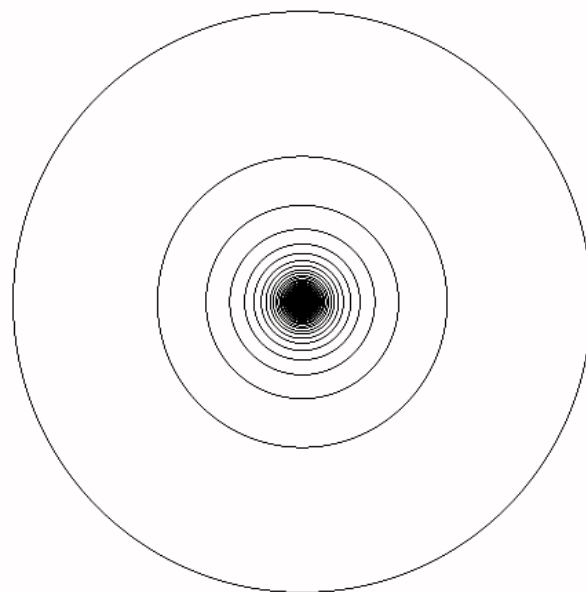
p_x :

p_y :

Q_{11} :

Q_{22} :

Q_{12} :



$q:$

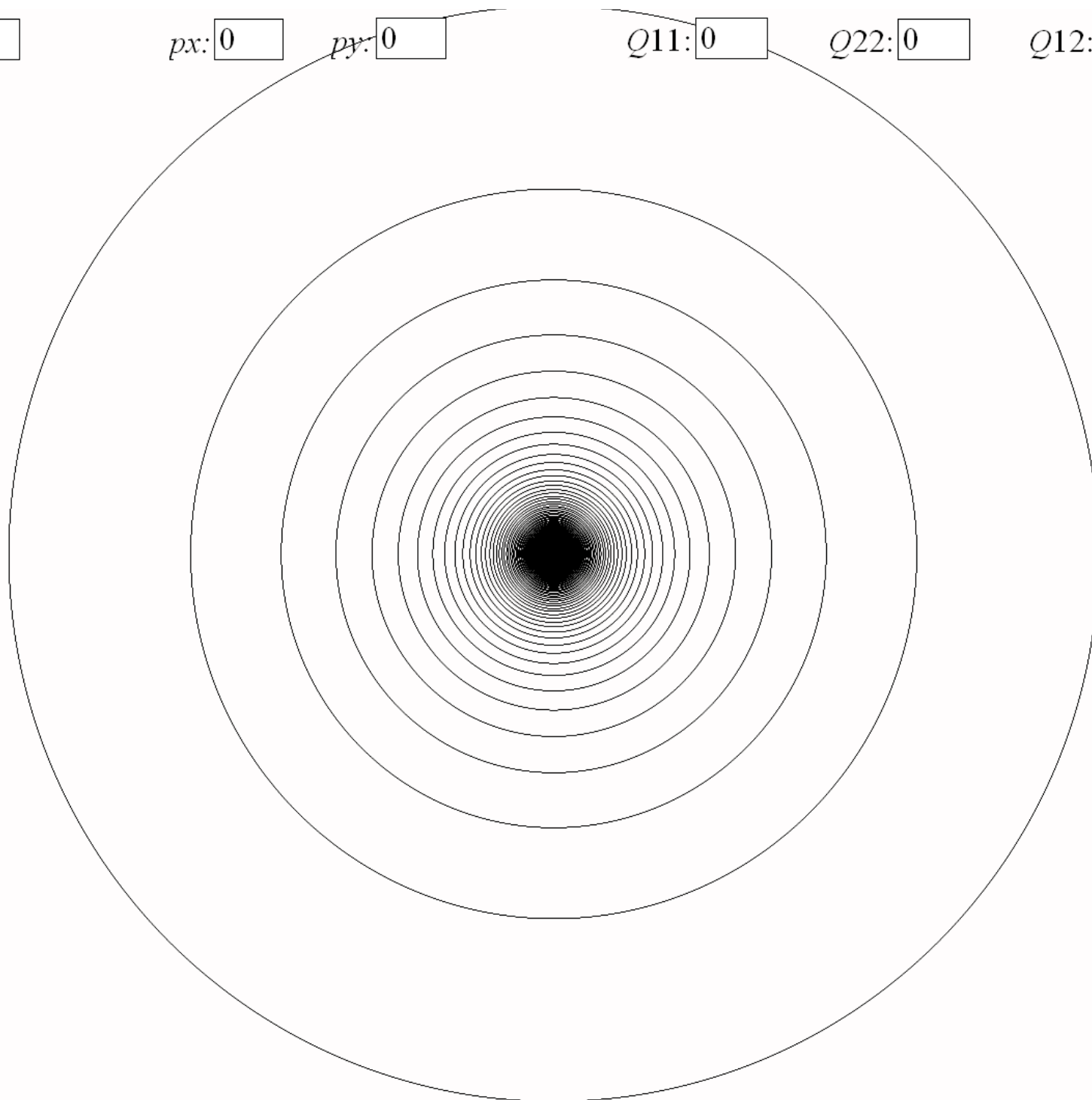
$px:$

$py:$

$Q11:$

$Q22:$

$Q12:$



$q:$

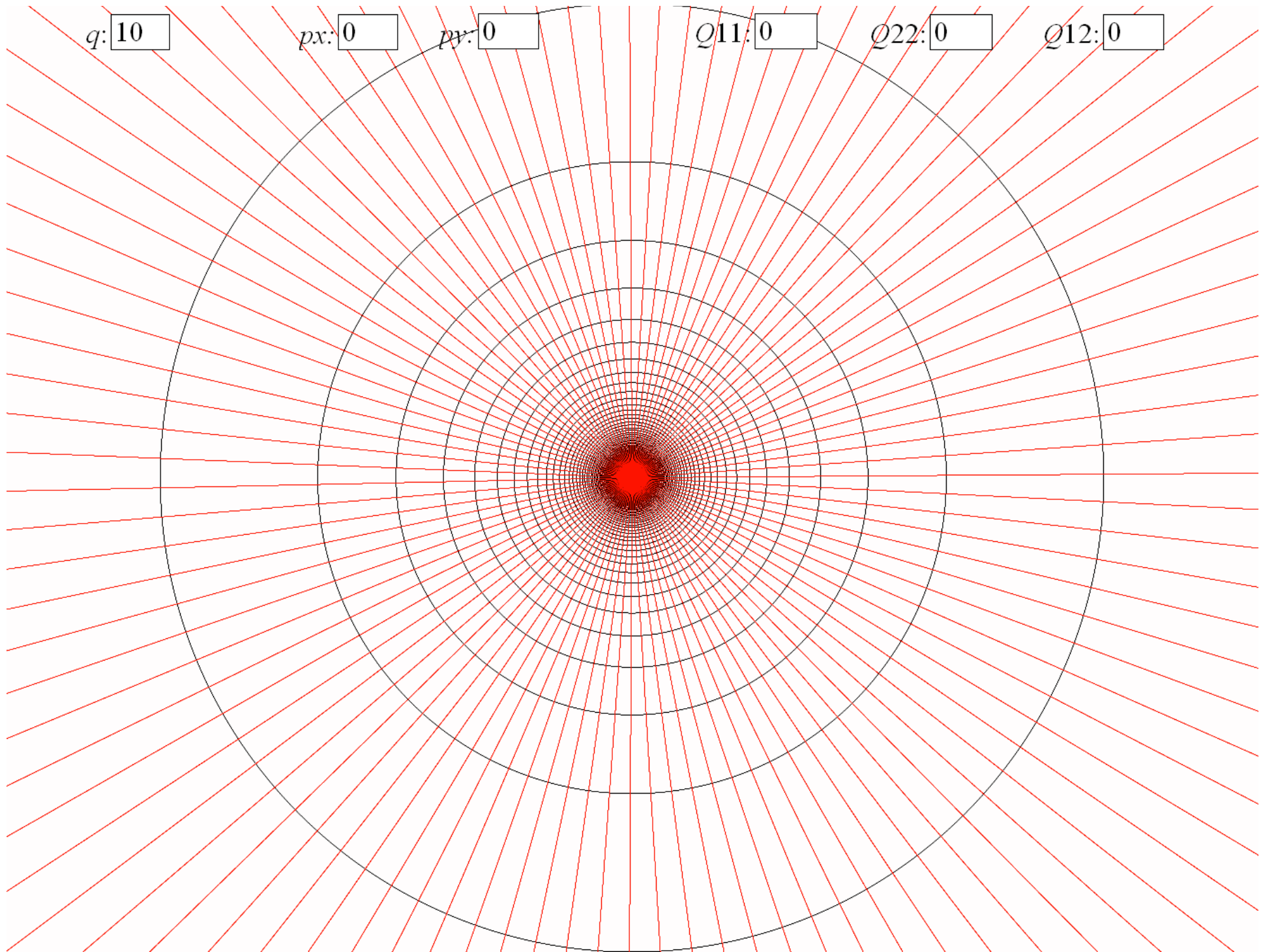
$px:$

$py:$

$Q11:$

$Q22:$

$Q12:$



q :

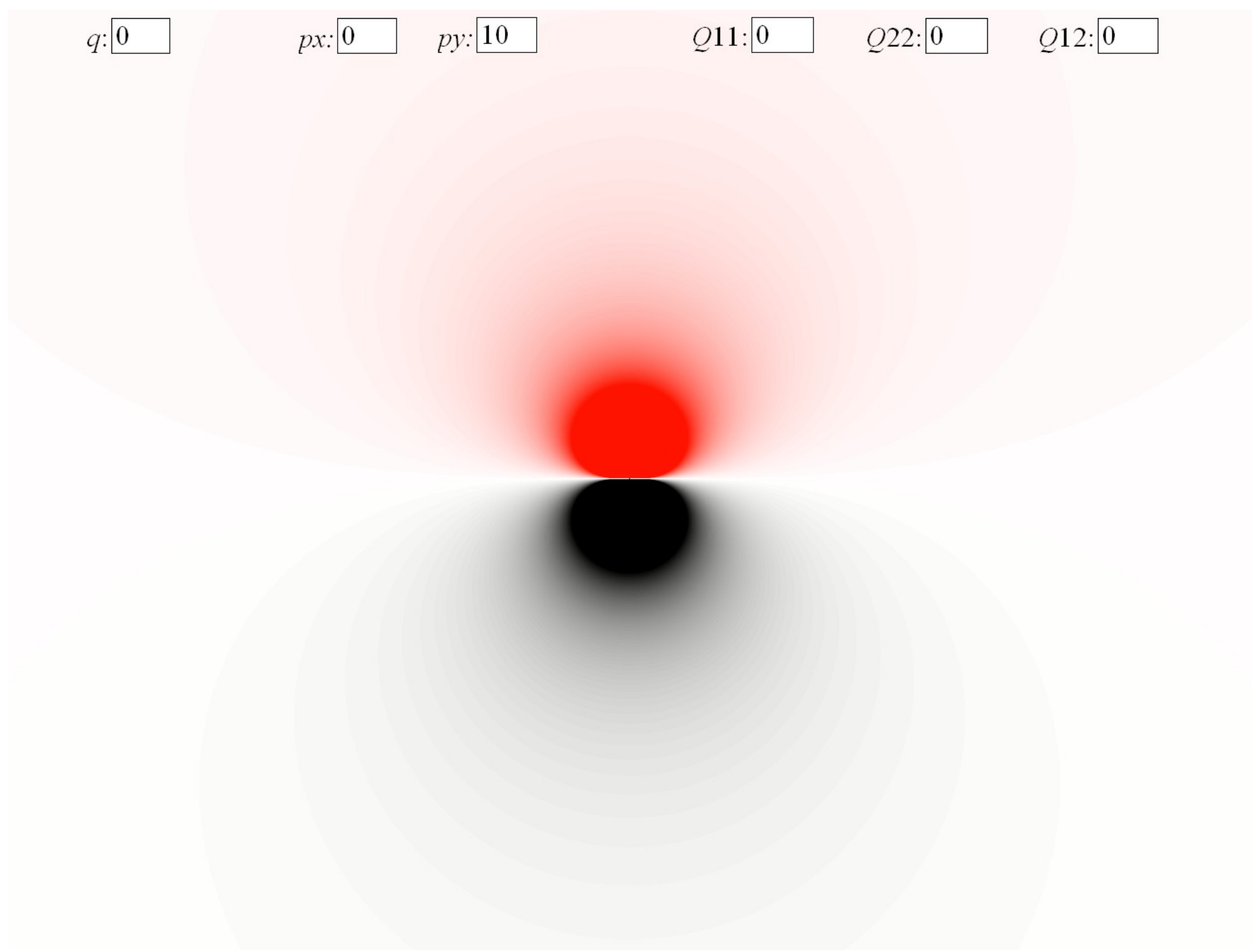
p_x :

p_y :

Q_{11} :

Q_{22} :

Q_{12} :



q :

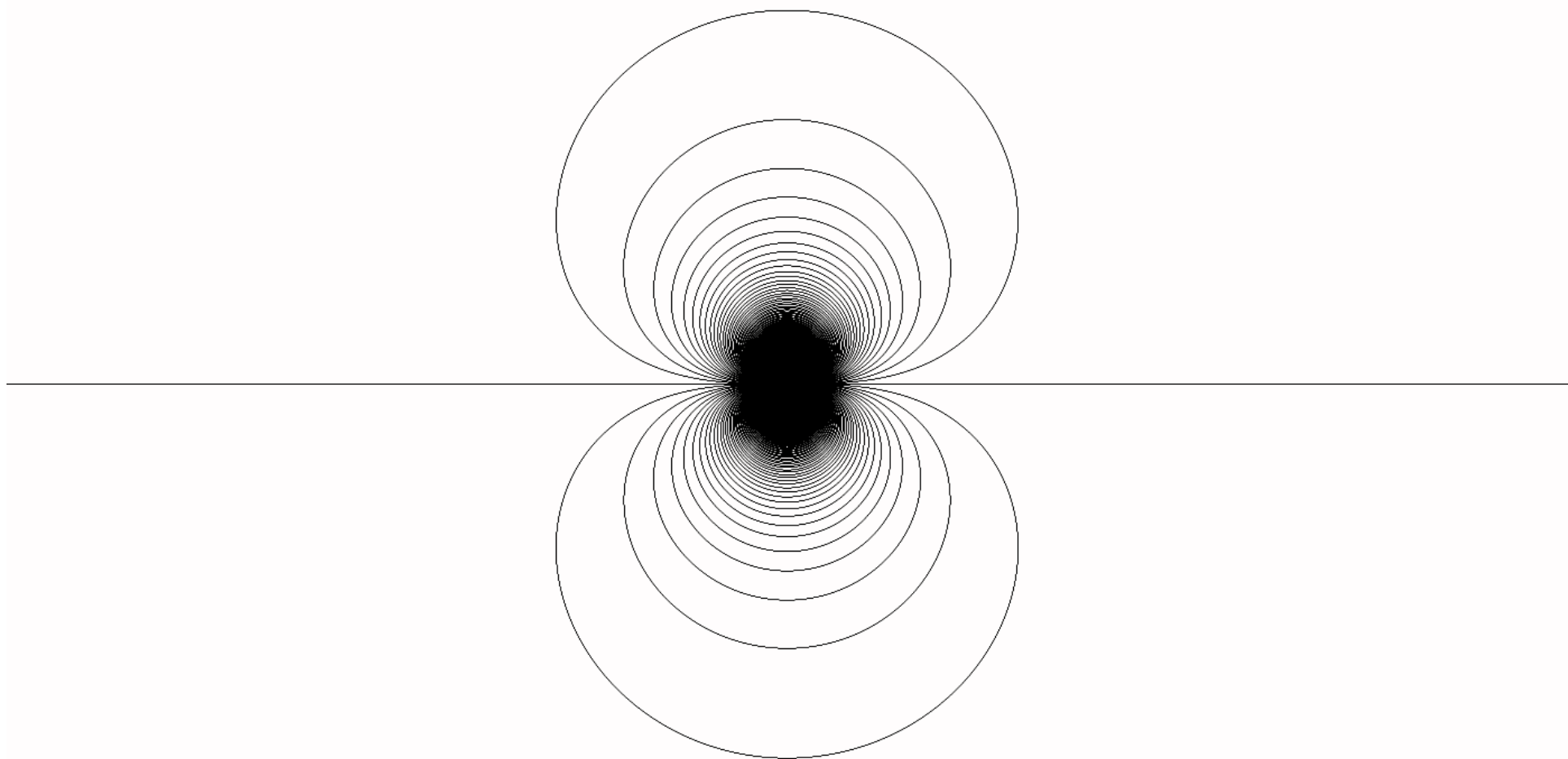
p_x :

p_y :

Q_{11} :

Q_{22} :

Q_{12} :



q :

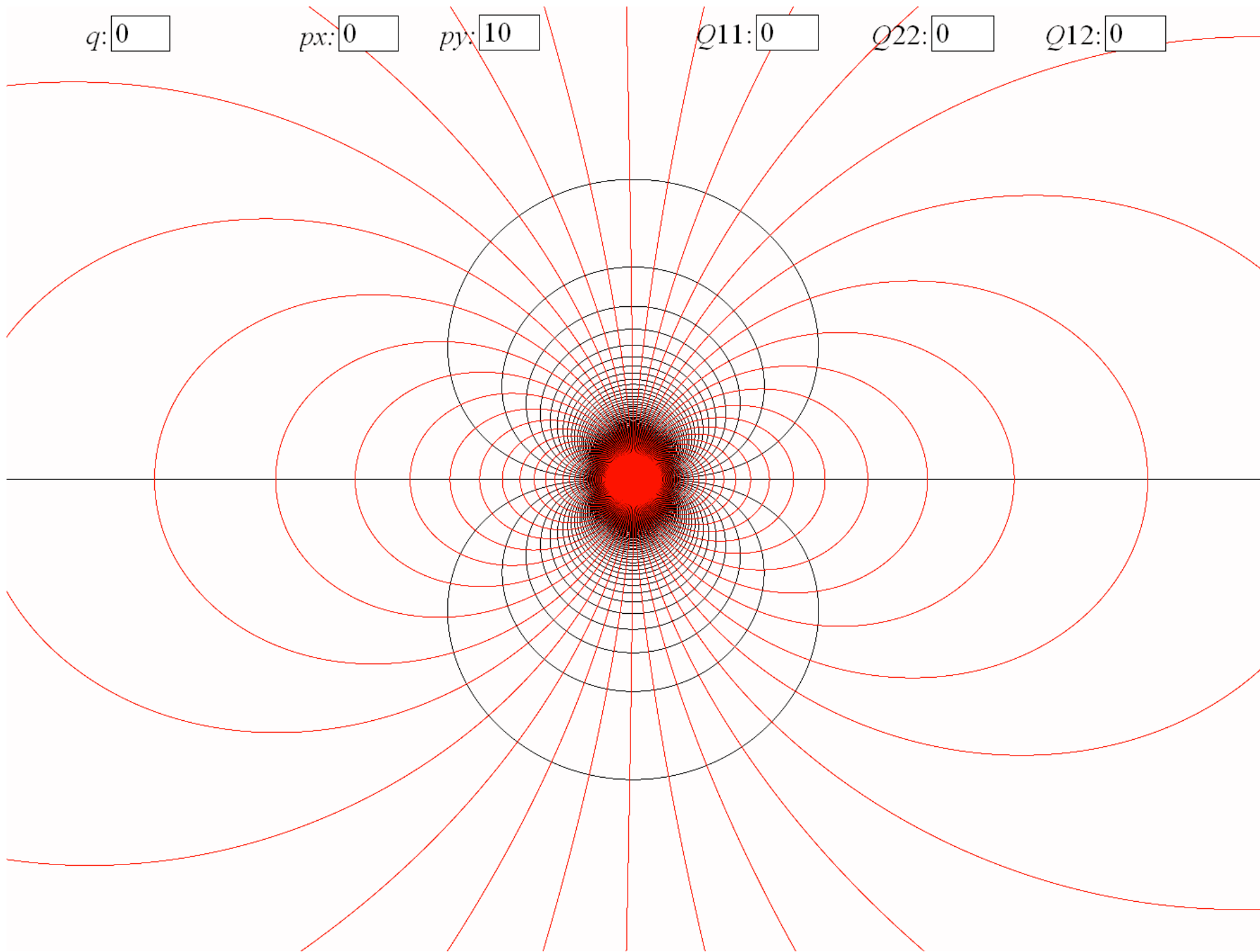
px :

py :

$Q11$:

$Q22$:

$Q12$:



$q:$

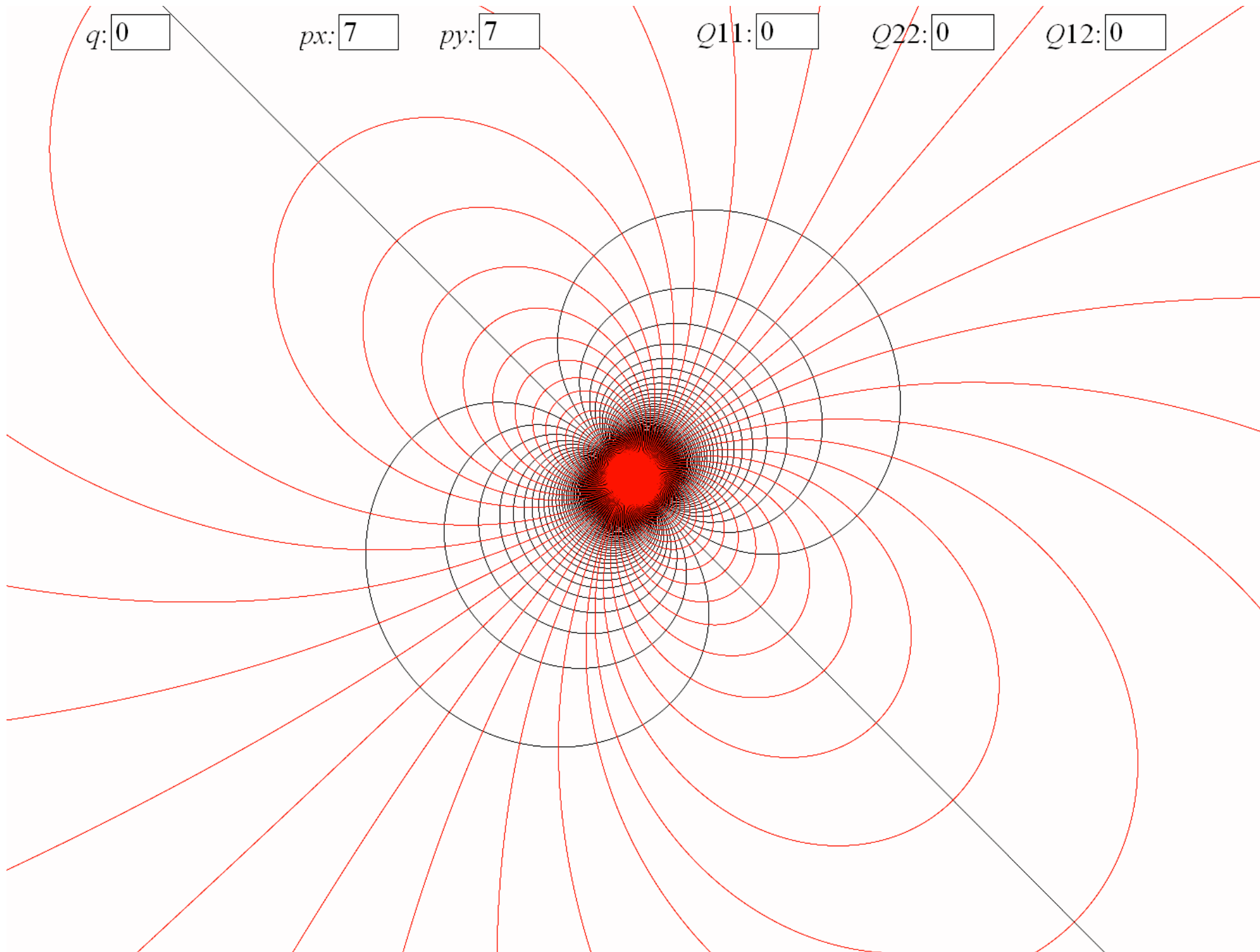
$px:$

$py:$

$Q11:$

$Q22:$

$Q12:$



q :

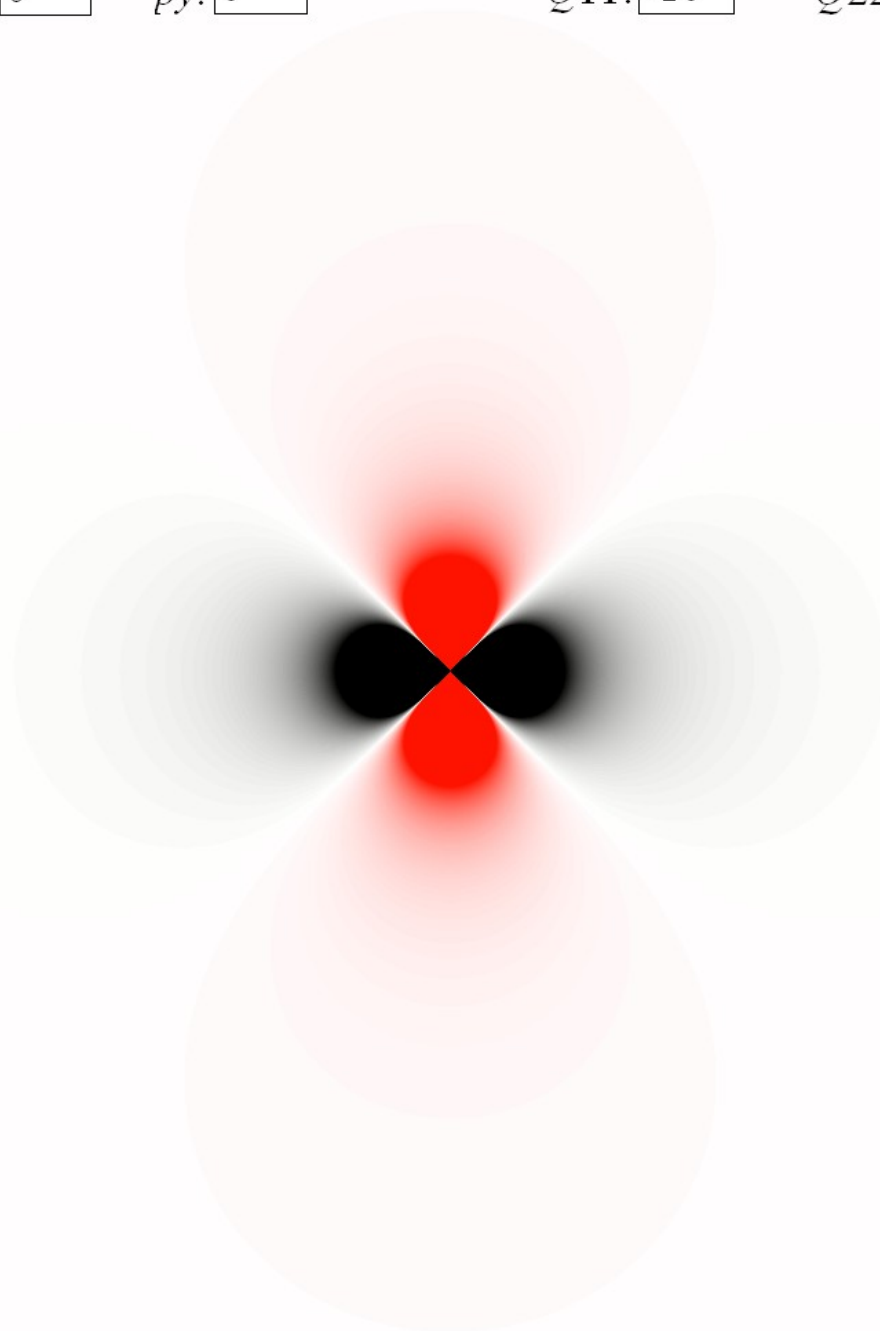
p_x :

p_y :

Q_{11} :

Q_{22} :

Q_{12} :



$q:$

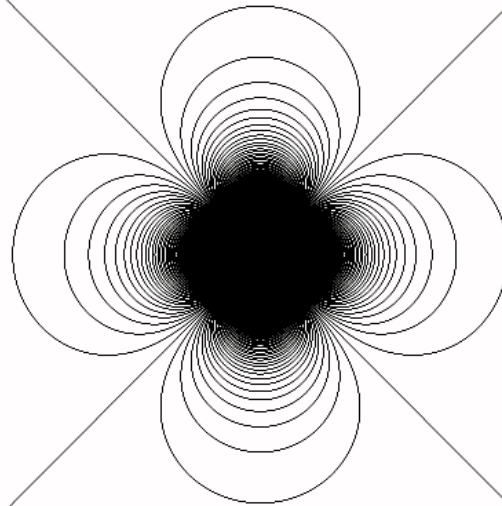
$px:$

$py:$

$Q_{11}:$

$Q_{22}:$

$Q_{12}:$



$q:$

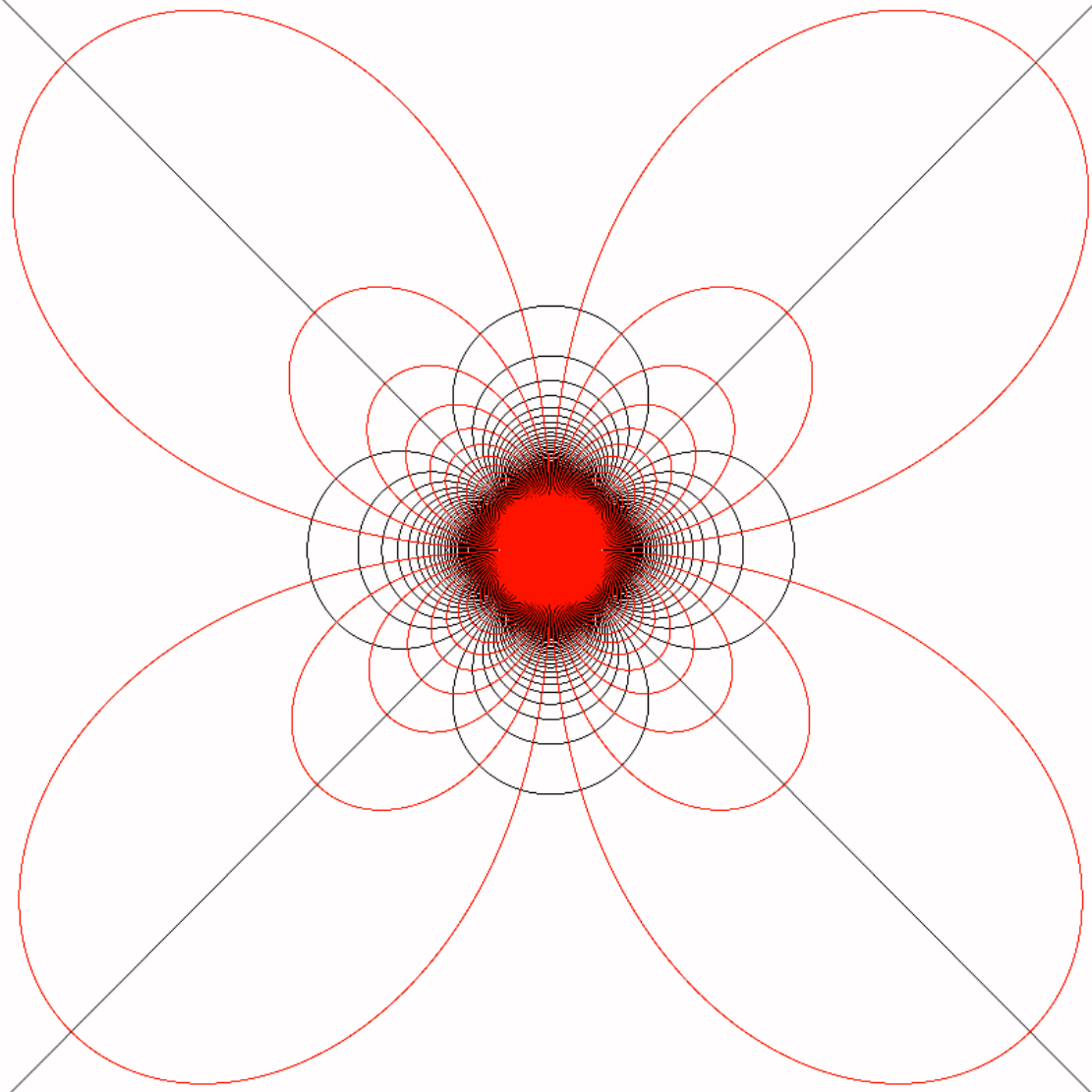
$px:$

$py:$

$Q_{11}:$

$Q_{22}:$

$Q_{12}:$



q :

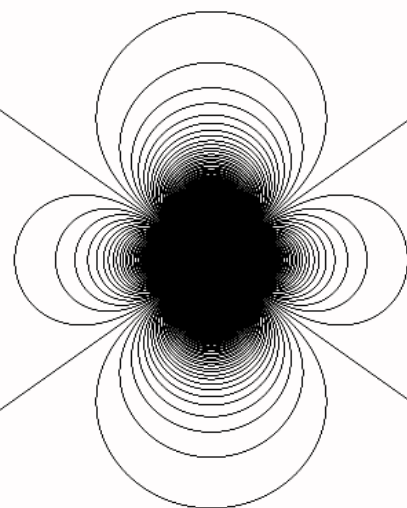
px :

py :

Q_{11} :

Q_{22} :

Q_{12} :



q :

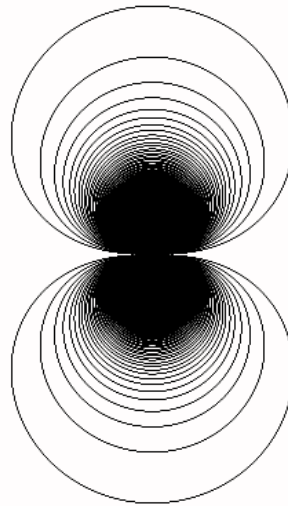
p_x :

p_y :

Q_{11} :

Q_{22} :

Q_{12} :



$q:$

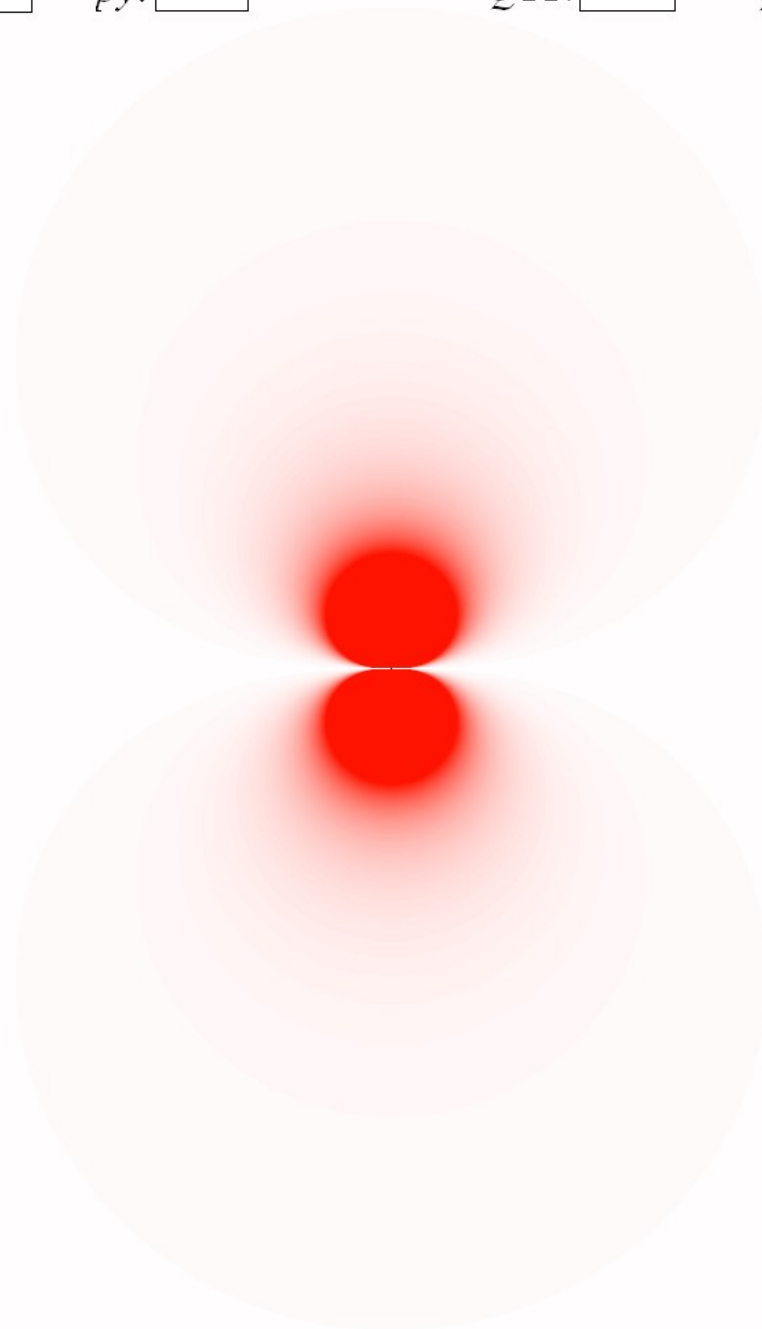
$px:$

$py:$

$Q_{11}:$

$Q_{22}:$

$Q_{12}:$



q :

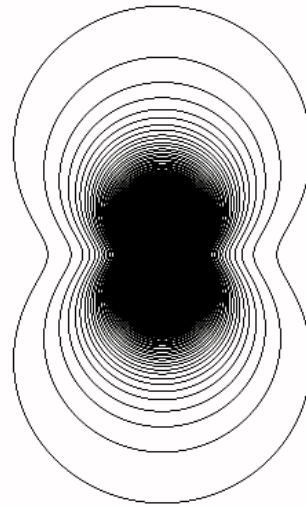
p_x :

p_y :

Q_{11} :

Q_{22} :

Q_{12} :



q :

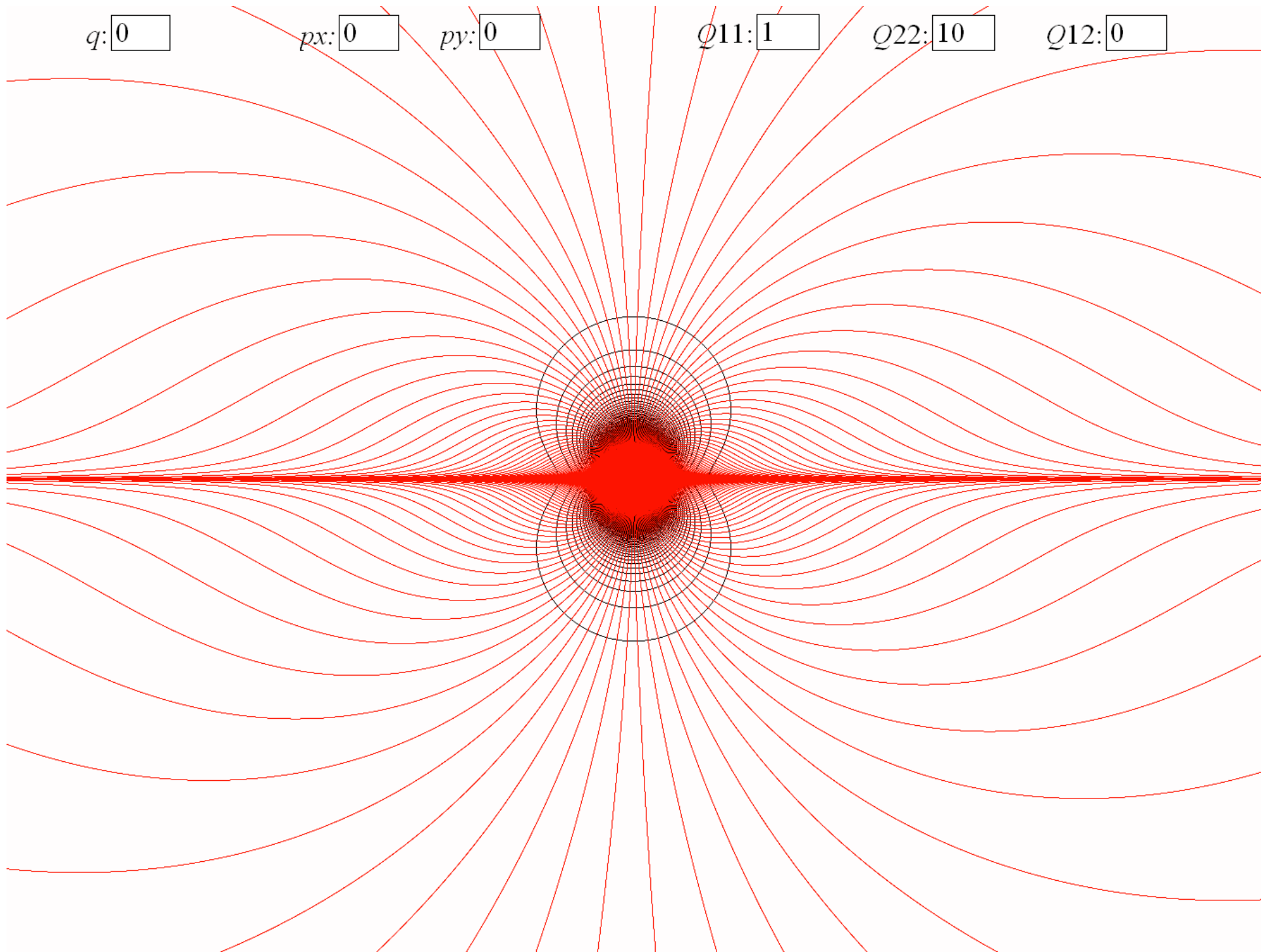
p_x :

p_y :

Q_{11} :

Q_{22} :

Q_{12} :



q :

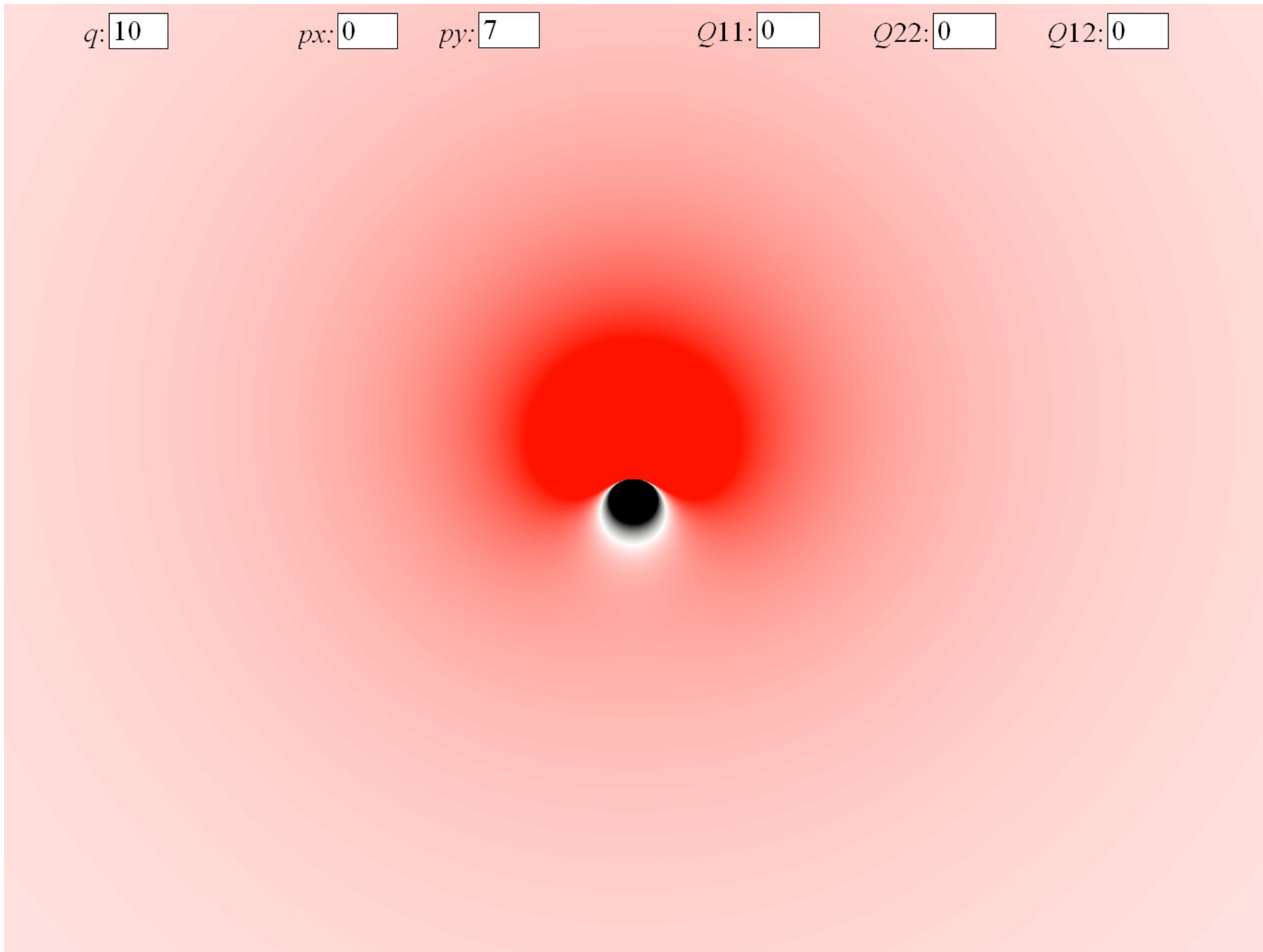
px :

py :

Q_{11} :

Q_{22} :

Q_{12} :



q :

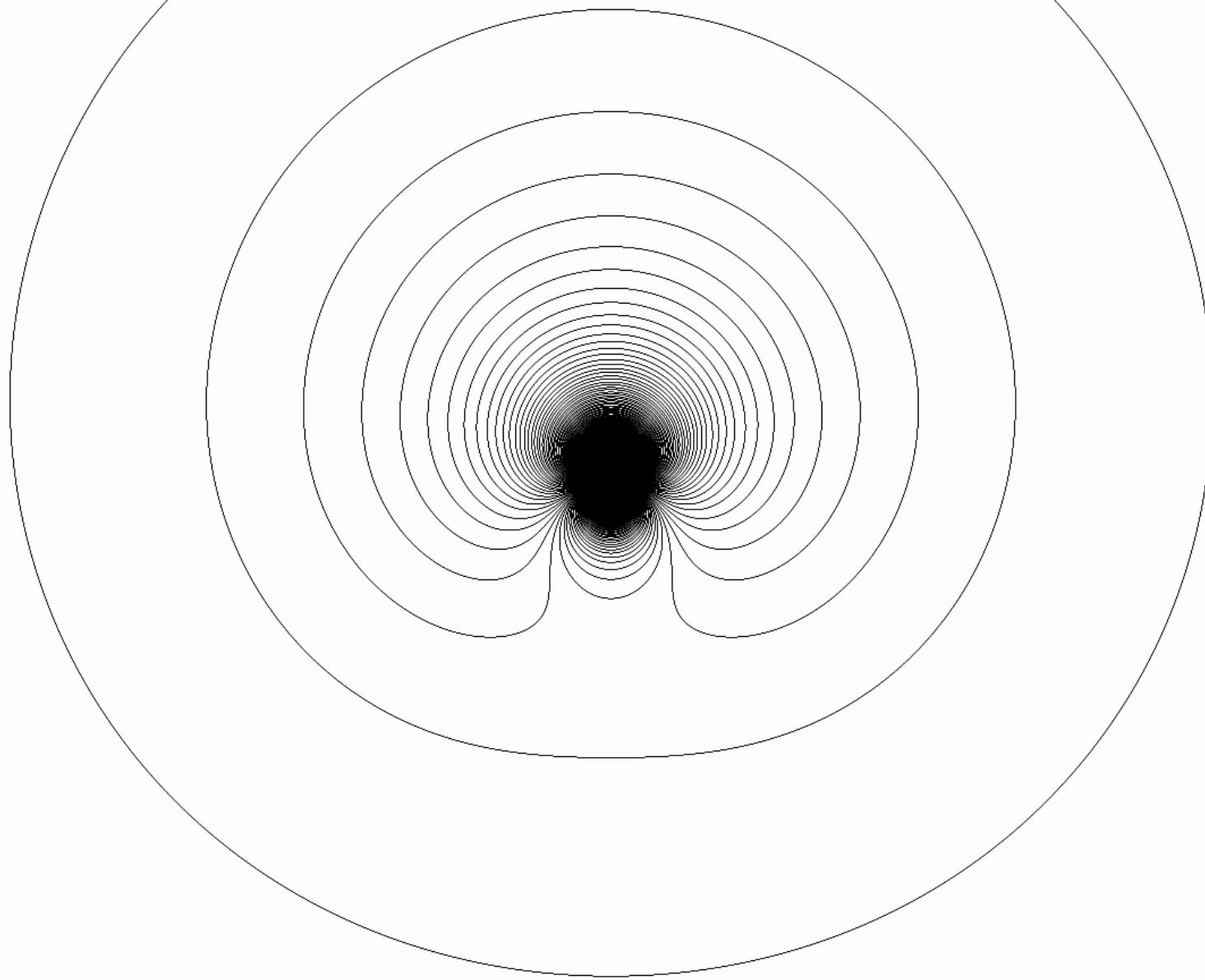
px :

py :

Q_{11} :

~~Q_{22} :~~

Q_{12} :



q : 10

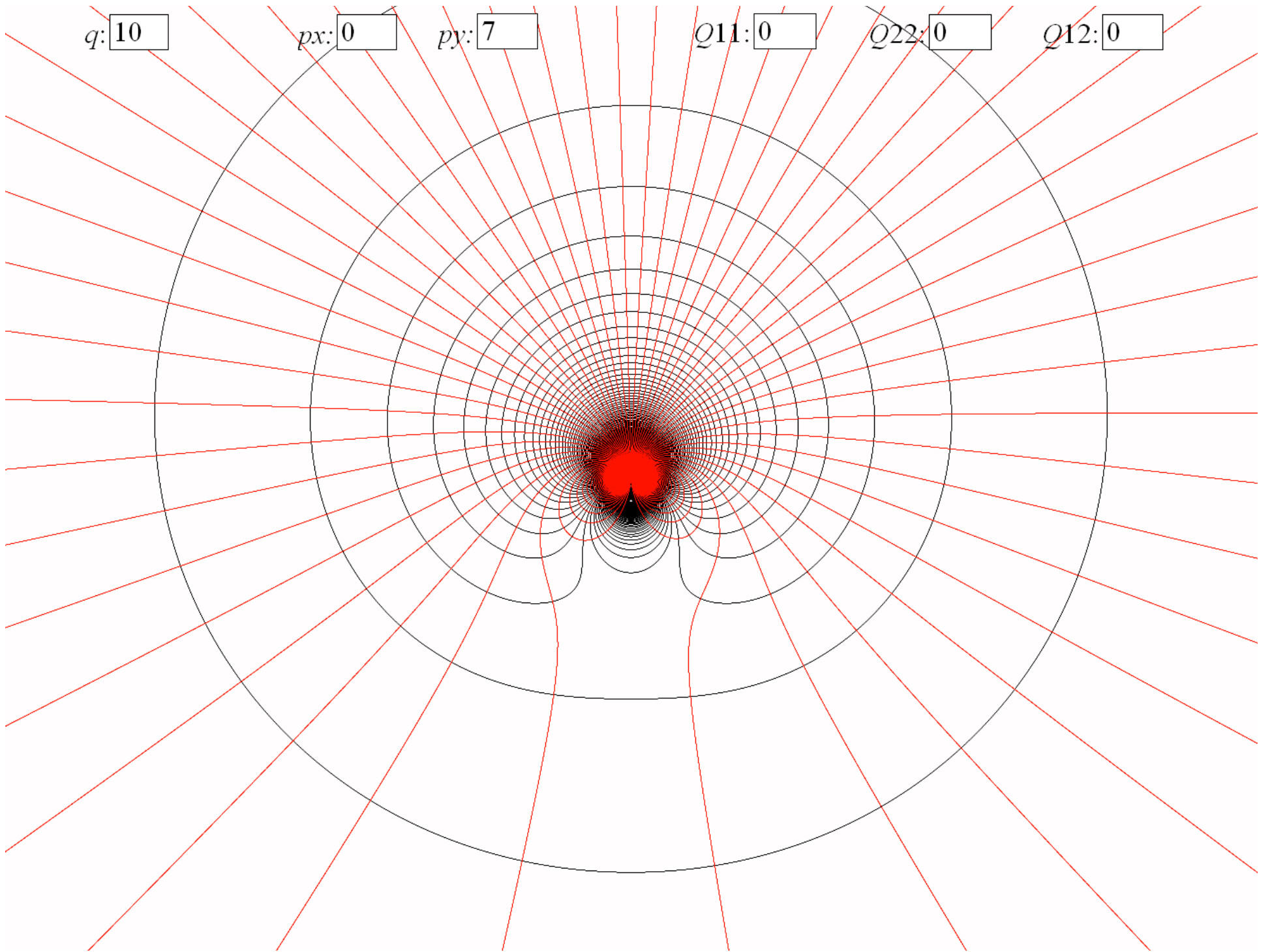
px : 0

py : 7

Q_{11} : 0

Q_{22} : 0

Q_{12} : 0



q :

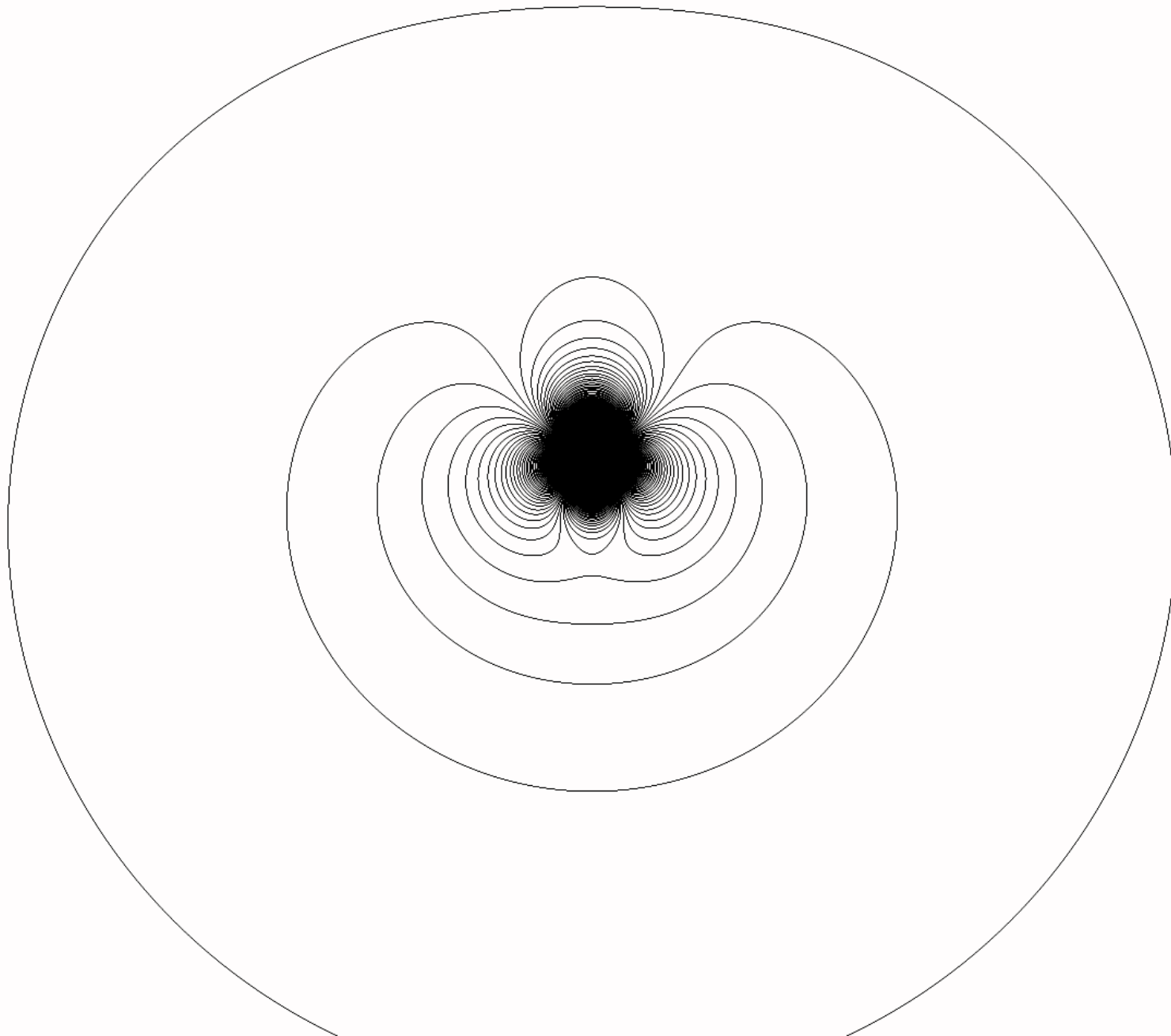
p_x :

p_y :

Q_{11} :

Q_{22} :

Q_{12} :



q :

p_x :

p_y :

Q_{11} :

Q_{22} :

Q_{12} :

