

Different Imaging Functions and their Numerical Tests

$$I_1(z) = \text{Im} \sum_{q=e_1, e_2} \int_{\Gamma_0^d} \int_{\Gamma_0^d} [\mathbb{T}_D(x_s, z)^T q] \cdot [\mathbb{T}_D(x_r, z)^T \overline{u_q^s(x_r, x_s)}] ds(x_r) ds(x_s).$$

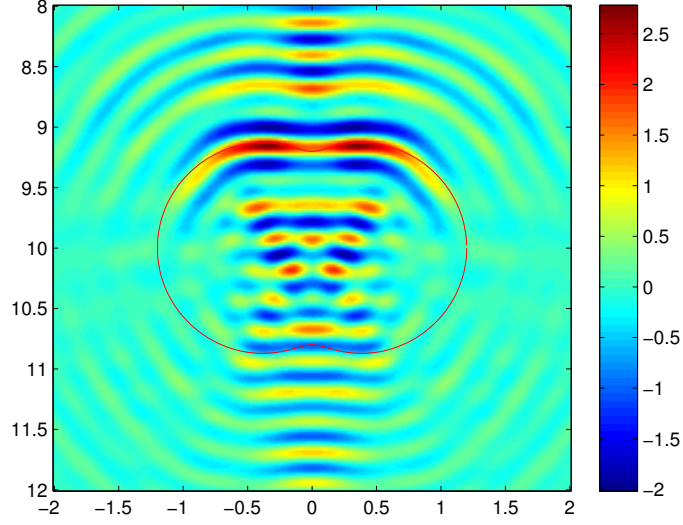


Figure 1. I_1

$$I_2(z) = \text{Im} \int_{\Gamma_0^d} \int_{\Gamma_0^d} \mathbf{i} \left[\frac{\partial \Phi^s(x_s, z)}{\partial x_2(x_s)} \right] \nabla_z \times [\mathbb{T}_D(x_r, z)^T \overline{u_{e_2}^s(x_r, x_s)}] ds(x_r) ds(x_s).$$

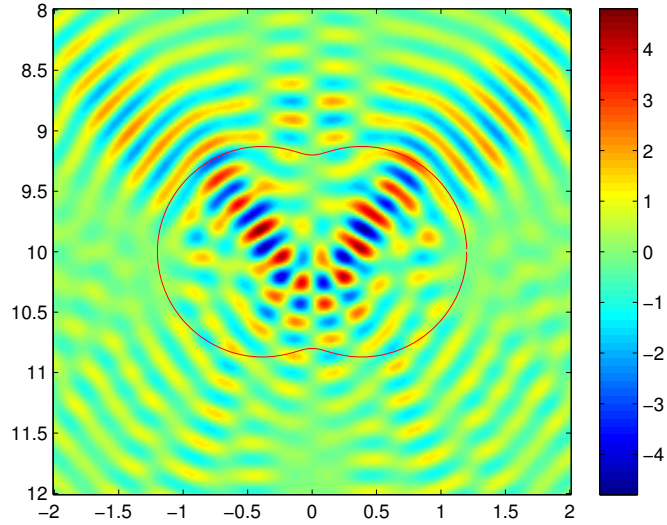


Figure 2. I_2

$$I_3(z) = \text{Im} \int_{\Gamma_0^d} \int_{\Gamma_0^d} \mathbf{i} \left[\frac{\partial \Phi^p(x_s, z)}{\partial x_2(x_s)} \right] \nabla_z \times [\mathbb{T}_D(x_r, z)^T \overline{u_{e_2}^s(x_r, x_s)}] ds(x_r) ds(x_s).$$

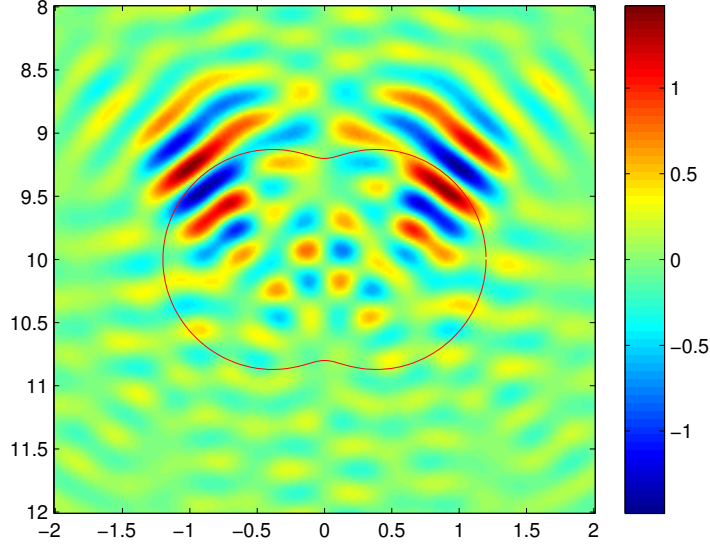


Figure 3. I_3

$$I_4(z) = \text{Im} \int_{\Gamma_0^d} \int_{\Gamma_0^d} \mathbf{i} \left[\frac{\partial \Phi^s(x_s, z)}{\partial x_2(x_s)} \right] \nabla_z \cdot [\mathbb{T}_D(x_r, z)^T \overline{u_{e_2}^s(x_r, x_s)}] ds(x_r) ds(x_s).$$

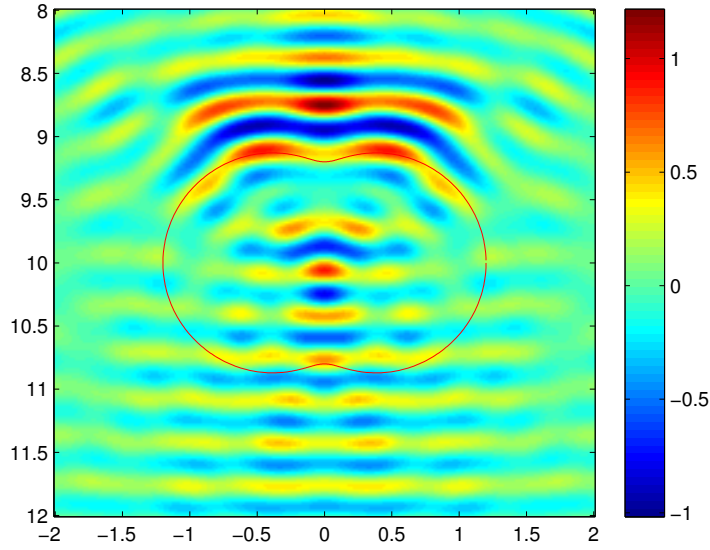


Figure 4. I_4

$$I_5(z) = \text{Im} \int_{\Gamma_0^d} \int_{\Gamma_0^d} \mathbf{i} \left[\frac{\partial \Phi^p(x_s, z)}{\partial x_2(x_s)} \right] \nabla_z \cdot [\mathbb{T}_D(x_r, z)^T \overline{u_{e_2}^s(x_r, x_s)}] ds(x_r) ds(x_s).$$

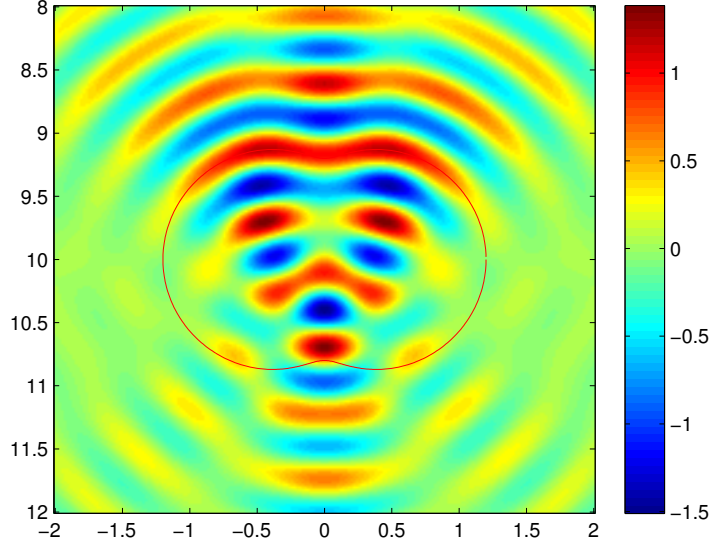


Figure 5. I_5

$$I_6(z) = \text{Im} \int_{\Gamma_0^d} \int_{\Gamma_0^d} \mathbf{i} \left[\frac{\partial \Phi^s(x_s, z)}{\partial x_2(x_s)} \right] \nabla_z \times [\mathbb{T}_D(x_r, z)^T \overline{u_{e_1}^s(x_r, x_s)}] ds(x_r) ds(x_s).$$

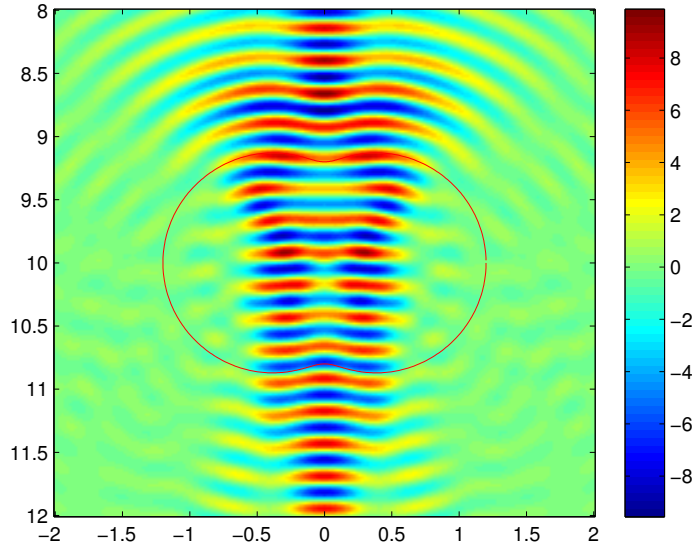


Figure 6. I_6

$$I_7(z) = \text{Im} \int_{\Gamma_0^d} \int_{\Gamma_0^d} \mathbf{i} \left[\frac{\partial \Phi^s(x_s, z)}{\partial x_2(x_s)} \right] \nabla_z \times [\mathbb{T}_D(x_r, z)^T \overline{u_{e_1}^s(x_r, x_s)}] ds(x_r) ds(x_s).$$

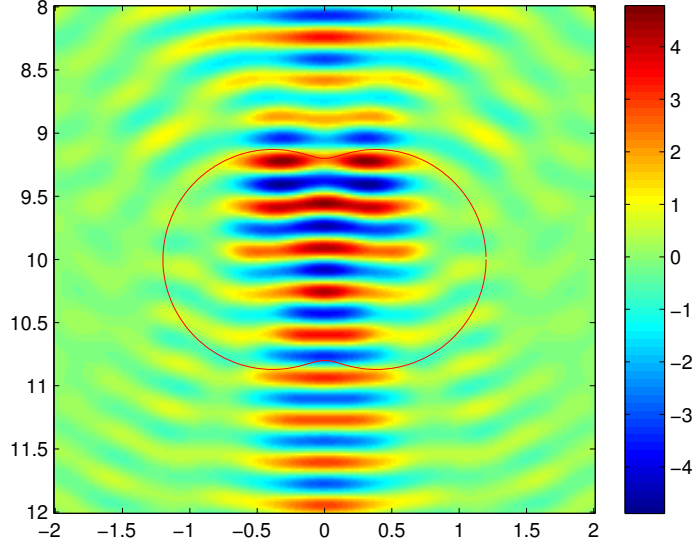


Figure 7. I_7

$$I_8(z) = \text{Im} \int_{\Gamma_0^d} \int_{\Gamma_0^d} \mathbf{i} \left[\frac{\partial \Phi^s(x_s, z)}{\partial x_2(x_s)} + \frac{\partial \Phi^p(x_s, z)}{\partial x_2(x_s)} \right] \nabla_z \cdot [\mathbb{T}_D(x_r, z)^T \overline{u_{e_2}^s(x_r, x_s)}] ds(x_r) ds(x_s).$$

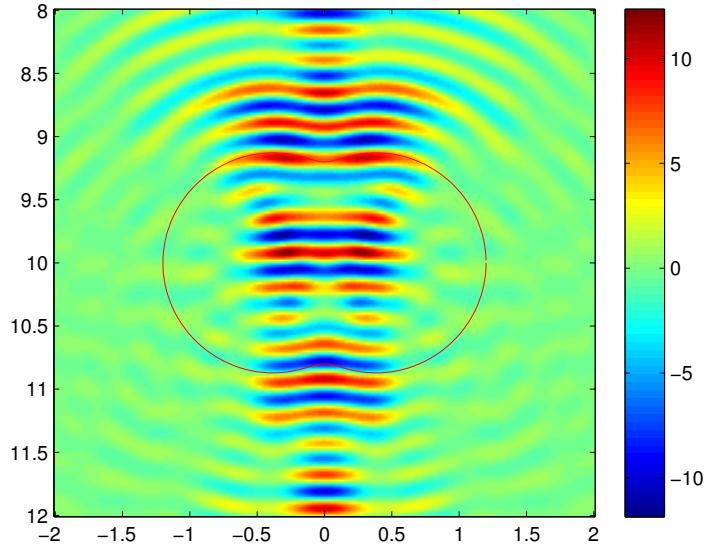


Figure 8. I_8

$$I_9(z) = \text{Im} \int_{\Gamma_0^d} \int_{\Gamma_0^d} \mathbf{i} \left[\frac{\partial \Phi^s(x_s, z)}{\partial x_2(x_s)} + \frac{\partial \Phi^p(x_s, z)}{\partial x_2(x_s)} \right] \nabla_z \times [\mathbb{T}_D(x_r, z)^T \overline{u_{e_1}^s(x_r, x_s)}] ds(x_r) ds(x_s).$$

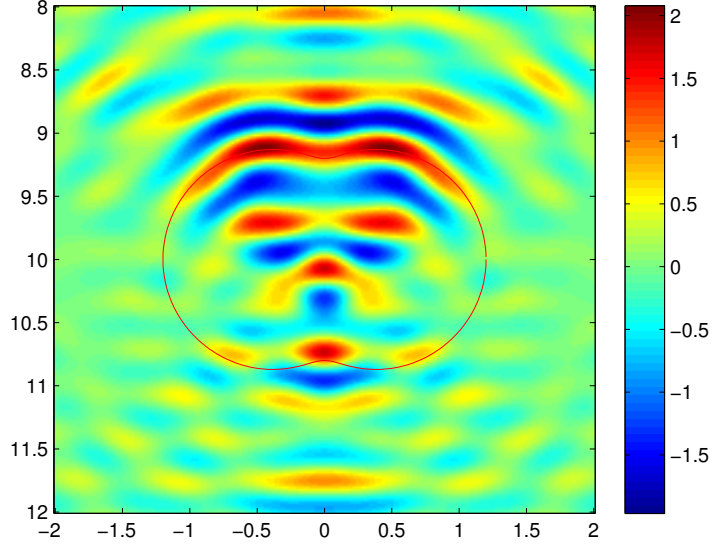


Figure 9. I_9

$$I_{10}(z) = \frac{c_s}{k_s} I_8(z) + \frac{c_p}{k_p} I_9(z)$$

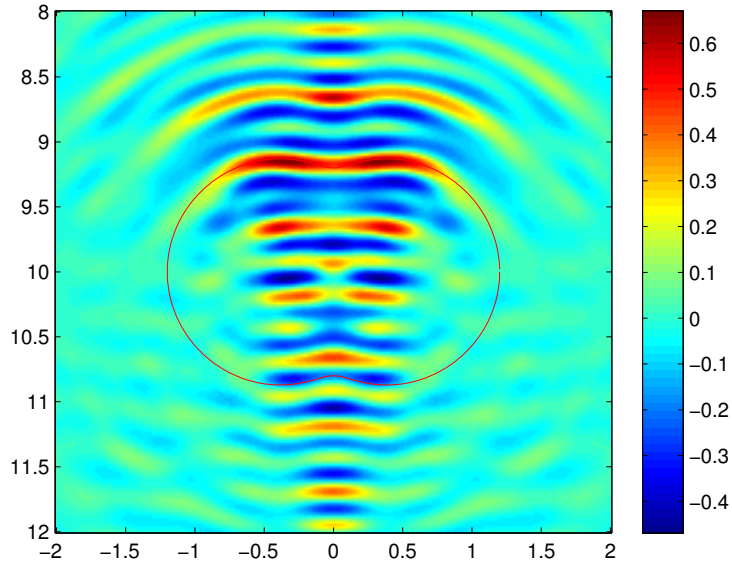


Figure 10. I_{10}

$$I_{11}(z) = \text{Im} \int_{\Gamma_0^d} \int_{\Gamma_0^d} \frac{\partial \Phi^p(x_s, z)}{\partial x_2(x_s)} \frac{\partial \Phi^p(x_r, z)}{\partial x_2(x_r)} [\overline{u_{e_2}^s(x_r, x_s)} \cdot e_2] ds(x_r) ds(x_s).$$

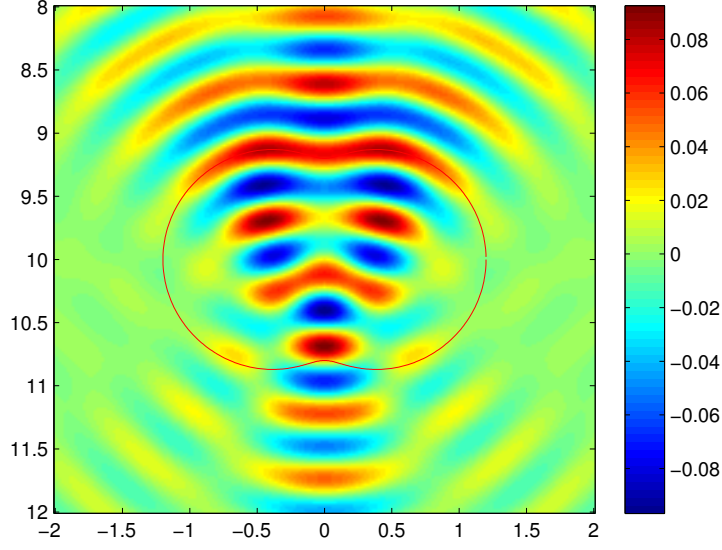


Figure 11. I_{11}

$$I_{12}(z) = \text{Im} \int_{\Gamma_0^d} \int_{\Gamma_0^d} \frac{\partial \Phi^s(x_s, z)}{\partial x_2(x_s)} \frac{\partial \Phi^s(x_r, z)}{\partial x_2(x_r)} [\overline{u_{e_1}^s(x_r, x_s)} \cdot e_1] ds(x_r) ds(x_s).$$

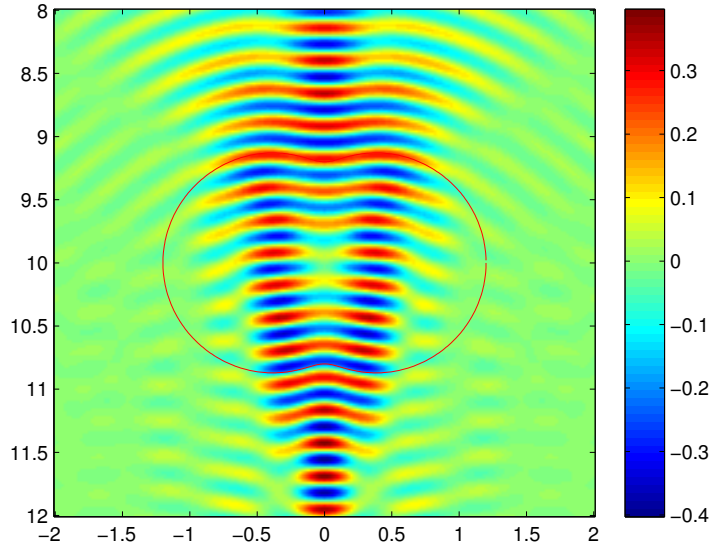


Figure 12. I_{12}

$$I_{13}(z) = \text{Im} \int_{\Gamma_0^d} \int_{\Gamma_0^d} \left[\frac{\partial \Phi^p(x_s, z)}{\partial x_2(x_s)} + \frac{\partial \Phi^s(x_s, z)}{\partial x_2(x_s)} \right] \left[\frac{\partial \Phi^p(x_r, z)}{\partial x_2(x_r)} + \frac{\partial \Phi^s(x_r, z)}{\partial x_2(x_r)} \right] [\overline{u_{e_2}^s(x_r, x_s)} \cdot e_2] ds(x_r) ds(x_s).$$

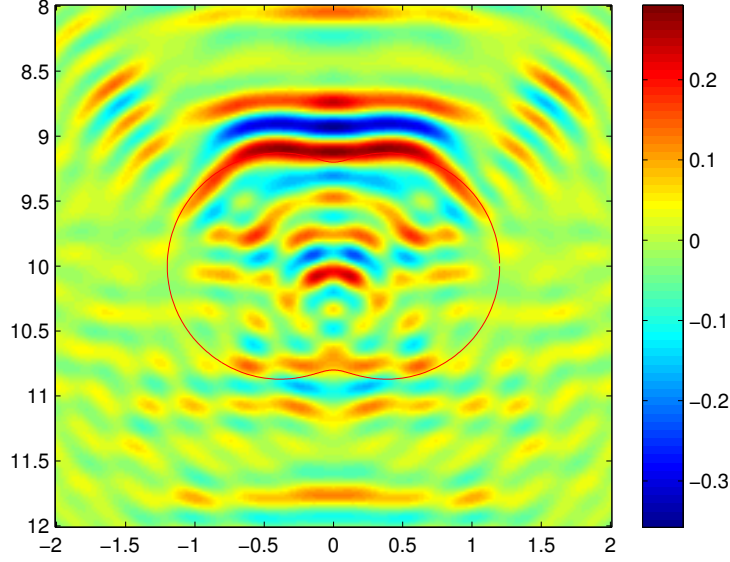


Figure 13. I_{13}

$$I_{14}(z) = \text{Im} \int_{\Gamma_0^d} \int_{\Gamma_0^d} \left[\frac{\partial \Phi^p(x_s, z)}{\partial x_2(x_s)} + \frac{\partial \Phi^s(x_s, z)}{\partial x_2(x_s)} \right] \left[\frac{\partial \Phi^p(x_r, z)}{\partial x_2(x_r)} + \frac{\partial \Phi^s(x_r, z)}{\partial x_2(x_r)} \right] [\overline{u_{e_1}^s(x_r, x_s)} \cdot e_1] ds(x_r) ds(x_s).$$

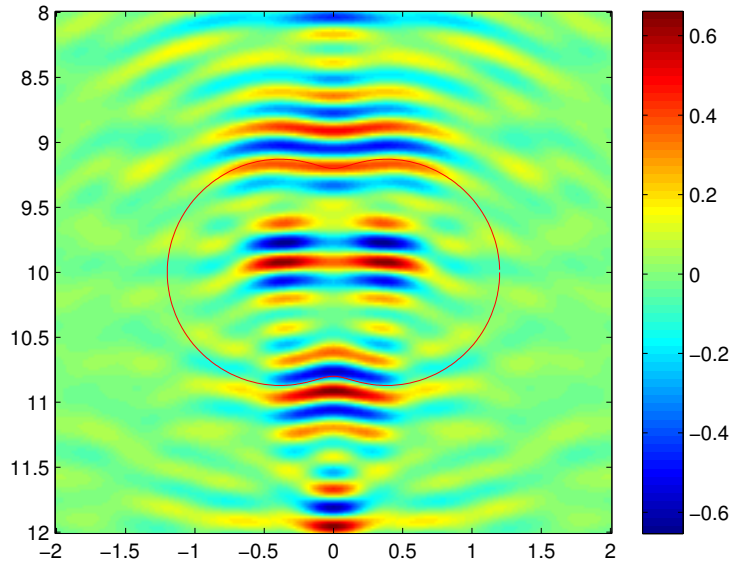


Figure 14. I_{14}

$$I_{15}(z) = c_p^2 I_{13}(z) + c_s^2 I_{14}.$$

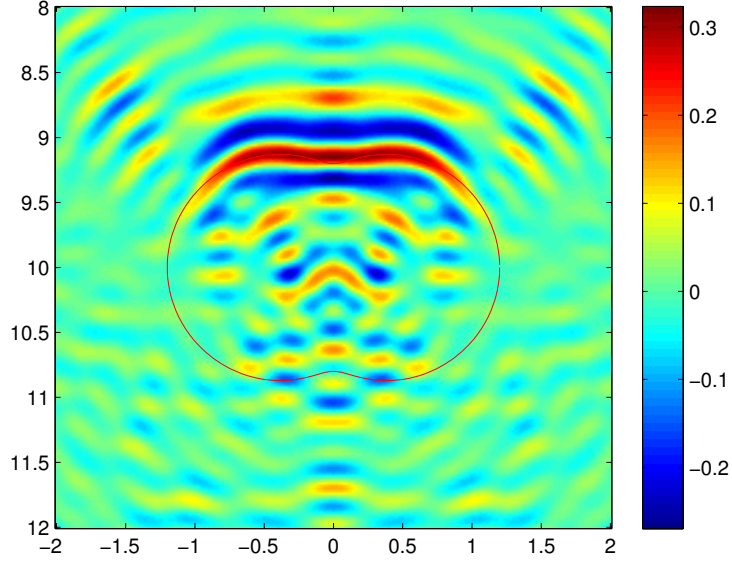


Figure 15. I_{15}

$$I_{16}(z) = \text{Im} \sum_{q=e_1, e_2} \int_{\Gamma_0^d} \int_{\Gamma_0^d} \nabla_z \cdot [\mathbb{T}_D(x_s, z)^T q] \cdot \nabla_z \cdot [\mathbb{T}_D(x_r, z)^T \overline{u_q^s(x_r, x_s)}] ds(x_r) ds(x_s).$$

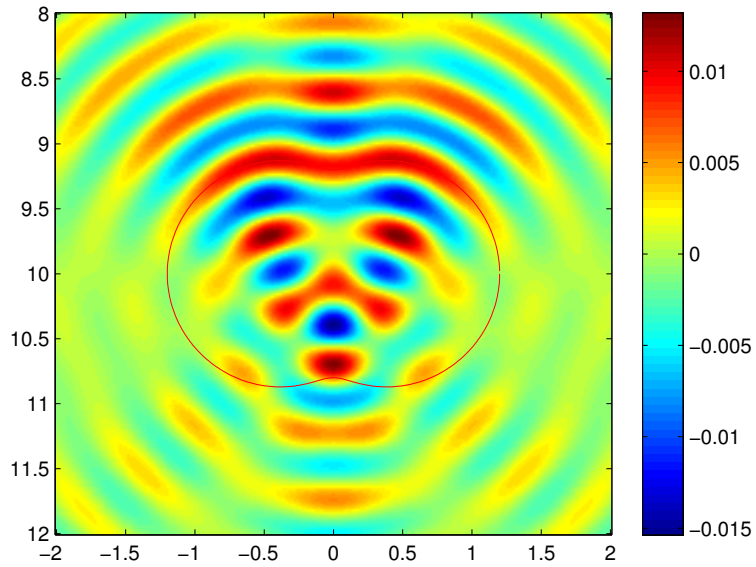


Figure 16. I_{16}

$$I_{17}(z) = \text{Im} \sum_{q=e_1, e_2} \int_{\Gamma_0^d} \int_{\Gamma_0^d} \nabla_z \times [\mathbb{T}_D(x_s, z)^T q] \cdot \nabla_z \times [\mathbb{T}_D(x_r, z)^T \overline{u_q^s(x_r, x_s)}] ds(x_r) ds(x_s).$$

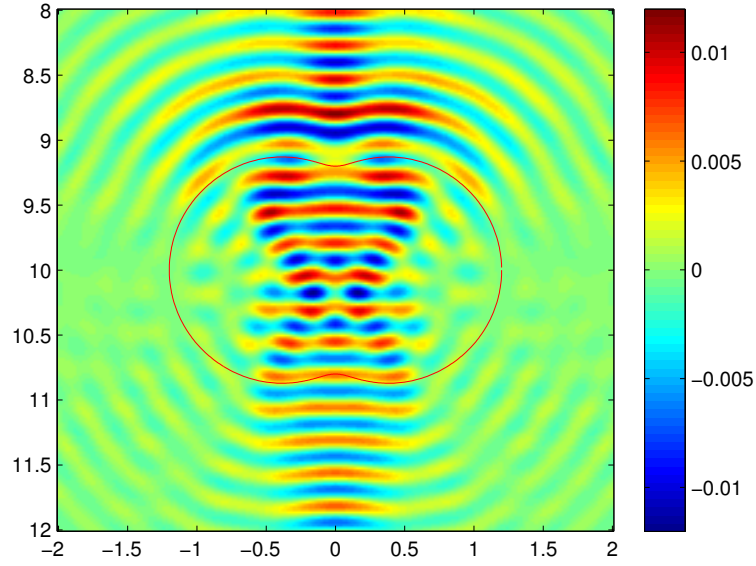


Figure 17. I_{17}