

$$\varphi_{z,\infty}(y) := \sum_{n=-\infty}^{\infty} \frac{4}{i|y|\pi(1+\delta_0n)} \frac{J_n(k|z|)}{H_n^{(1)}(k|y|)} \cos(n\theta_{yz}), \quad y \in \partial B,$$