Wireless Charging Simulation for Electric Scooter (Python Code)

```python
import time
import math
import random

# -------------------------------
# Wireless Charging Parameters
# -------------------------------
TX_POWER = 500          # Transmitter power in Watts
FREQUENCY = 85e3        # 85 kHz (standard EV wireless charging)
COUPLING_COEFF = 0.32   # Coil coupling factor
EFFICIENCY = 0.85       # Power electronics efficiency

# -------------------------------
# Battery Parameters
# -------------------------------
BATTERY_CAPACITY = 2.0      # kWh (typical electric scooter)
BATTERY_VOLTAGE = 48        # Volts
SOC = 20.0                  # Initial State of Charge (%)

# -------------------------------
# Wireless Power Transfer Model
# -------------------------------
def wireless_power_received(tx_power, coupling, efficiency):
    """Calculate received wireless power"""
    received_power = tx_power * coupling * efficiency
    return received_power

# -------------------------------
# Battery Charging Model
# -------------------------------
def charge_battery(soc, received_power, duration_hours):
    """Update battery SOC"""
    energy_received = received_power * duration_hours / 1000  # kWh
    soc_increment = (energy_received / BATTERY_CAPACITY) * 100
    soc += soc_increment
    return min(soc, 100)

# -------------------------------
# Simulation Loop
# -------------------------------
print("Wireless Charging Started for Electric Scooter...\n")

charging_time = 0  # hours

while SOC < 100:
    received_power = wireless_power_received(
        TX_POWER,
        COUPLING_COEFF + random.uniform(-0.02, 0.02),
        EFFICIENCY
    )

    SOC = charge_battery(SOC, received_power, 0.1)
    charging_time += 0.1

    print(f"Time: {charging_time:.1f} hr | "
          f"Received Power: {received_power:.2f} W | "
          f"SOC: {SOC:.2f} %")

    time.sleep(0.5)

print("\nCharging Complete!")
print(f"Total Charging Time: {charging_time:.2f} hours")
```