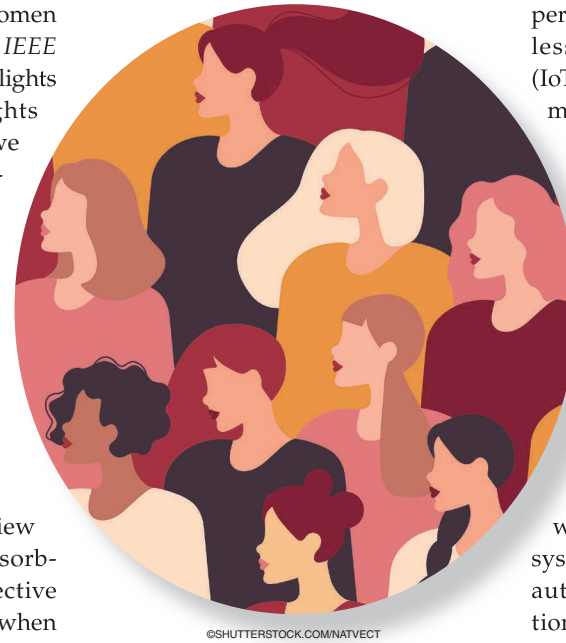
From the Guest Editors' Desk

Women in Microwaves

■ **Jasmin Grosinger, Wenquan Che, and Sherry Hess**

This inaugural issue on Women in Microwaves (WiM) of *IEEE Microwave Magazine* highlights female researchers and spotlights their research. In this issue, we hope to focus attention particularly from young professionals, on the microwave theory and techniques-related publications of a few female researchers. Two issues of *IEEE Microwave Magazine*, with a total of six feature articles, will be devoted to the excellent technical contributions of women in microwave theory and techniques.

In this issue, Han et al. review frequency-selective radome absorbers that combine frequency-selective surfaces with absorbers, thus—when applied—reducing the radar cross sections of antenna radomes considerably, in their article "Frequency-Selective Rasorbers: A View of Frequency-Selective Rasorbers and their Application in Reducing the Radar Cross Sections of Antennas." Next, Marzall et al.'s article "Active and Passive Components for Broadband Transmit Phased Arrays: Broadband Transmit Front-End Components" focuses on active and passive transmitter front-end components of phased array antennas, providing broadband behavior in the microwave and millimeter-wave ranges. Hubrechsen et al. provide an overview of how to perform reverberation-chamber wireless testing for Internet of Things (IoT) devices, focusing on the transmission protocol narrowband IoT in "Reverberation Chamber Metrology for Wireless Internet of Things Devices: Flexibility in Form Factor, Rigor in Test."



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In the March 2022 issue, Costanzo et al.'s article "Wearable Energy Autonomous RF Microwave Systems: Chipless and Energy-Harvesting-Based Wireless Systems for Low-Power, Low-Cost Localization and Sensing" will overview selected microwave and millimeter-wave wireless systems for IoT that provide energy autonomy and batteryless operation. In "Internet of Things Networks: Enabling Simultaneous Wireless Information and Power Transfer," Dhull et al. will focus on enabling simultaneous wireless information and power transfer in IoT networks and their base stations, elaborating on beamforming and signal design to improve the wireless performance. Finally, Grosinger and Michalowska-Forsyth will review passive wireless sensor tags and their use in space, focusing on their ultra-low-power operation

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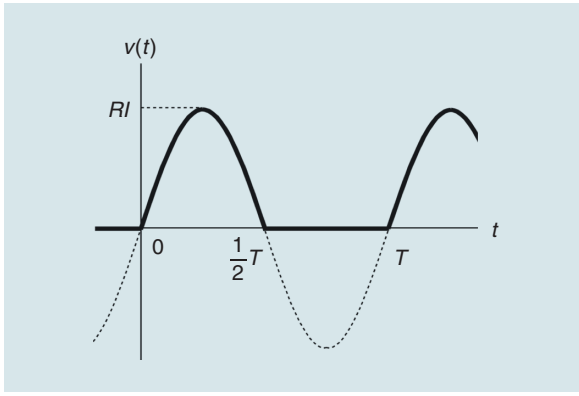

Figure 3. *The voltage waveform across the diode.*

$$= \frac{1}{T}\int_0^{T/2} RI\sin\omega t \begin{bmatrix} 1 \\ 2\sin\omega t \\ 2\cos\omega t \end{bmatrix} dt$$

$$= \frac{RI}{\omega T}\begin{bmatrix} -\cos\omega t \\ \omega t - \frac{1}{2}\sin 2\omega t \\ -\frac{1}{2}\cos 2\omega t \end{bmatrix}_0^{T/2}$$

$$= \frac{RI}{2\pi}\begin{bmatrix} 2 \\ \pi \\ 0 \end{bmatrix}. \tag{4}$$

Now we are ready to estimate the power conversion efficiency in question. Since we assume the RF current source to have only a fundamental sine component, the voltage vector (4) simply produces the input effective power

$$P_{\text{in}} = \frac{1}{2}[V_P\, V_Q]\begin{bmatrix} I \\ 0 \end{bmatrix} = \frac{1}{4}RI^2. \tag{5}$$

Also from (4), the dc output power calculates

$$P_{\text{out}} = \frac{V_O^2}{R} = \frac{1}{\pi^2}RI^2. \tag{6}$$

Finally, the quotient of (6) to (5) brings the power conversion efficiency to

$$\eta = \frac{P_{\text{out}}}{P_{\text{in}}} = \frac{4}{\pi^2} \approx 0.4. \tag{7}$$

Therefore, the correct answer to last month's quiz is (a).

One may be afraid that the efficiency of 40% is insufficient for use in RF power electronics. Indeed it is, but that is a natural consequence of the primitive configuration. Remember that we are just on the first step of a long journey. Next month will add two *LC* elements to the circuit. We can count on them to boost the rectifier performance substantially. So stay tuned.

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and radiation hardness in their article "Space Tags: Ultra-Low-Power Operation and Radiation Hardness for Passive Wireless Sensor Tags."

The WiM subcommittee organized this focus issue. The WiM subcommittee is under the Member and Geographic Activities Committee of the Microwave Theory and Techniques Society's (MTT-S) Administrative Committee.

The goal of the WiM subcommittee is to build a WiM network that attracts, scales, and connects. Our objectives are to promote women engineers and scientists in the microwave community, attract women graduate students and professionals to join our Society, and increase the visibility of women within our Society. Different kinds of activities have been carried out globally through WiM subcommittee members' leading efforts, such as the organization of WiM special sessions at MTT-S sponsored conferences. Those activities have increased the visibility of distinguished women researchers and inspired young female students to follow these career paths. Readers can learn more about the WiM subcommittee and its activities by visiting our webpage, https://mtt.org/women-in-microwaves/.

We are grateful to Editor-in-Chief Dr. Robert Caverly and his team for helping us make this inaugural issue a reality by leading the rigorous process of reviewing and revising the articles that were submitted.