Nonlinear Interaction of Waves in Rotating Spherical Layers

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Flows of a viscous incompressible fluid in a spherical layer that are due to rotational oscillations of its inner boundary at two frequencies with respect to the state of rest are numerically studied. It is found that an increase in the amplitude of oscillations of the boundary at the higher frequency can result in a significant enhancement of the low-frequency mode in a flow near the outer boundary. The direction of propagation of the low-frequency wave changes from radial to meridional, whereas the high-frequency wave propagates in the radial direction in a limited inner region of the spherical layer. The role of the meridional circulation in the energy exchange between spaced waves is demonstrated.